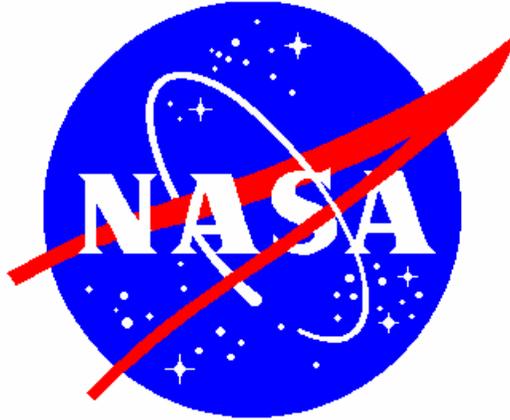


Attachment A

**SPECIFICATIONS FOR
REPAIR ROOFS
VARIOUS BUILDINGS**



**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GLENN RESEARCH CENTER
21000 BROOKPARK ROAD, CLEVELAND, OHIO 44135**

97011

JUNE 16, 2004

PROJECT TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

01110 SUMMARY OF WORK
01315 PROJECT MEETINGS
01330 SUBMITTALS
01411 GENERAL SAFETY REQUIREMENTS
01500 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS
01600 PRODUCT REQUIREMENTS
01780 CLOSEOUT SUBMITTALS

DIVISION 02 - SITE CONSTRUCTION

02220 DEMOLITION

DIVISION 04 - MASONRY

04200 MASONRY UNIT

DIVISION 06 - WOOD AND PLASTICS

06100 ROUGH CARPENTRY

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07220 ROOF AND DECK INSULATION
07511 BUILT-UP ASPHALT ROOFING COLD PROCESS
07512 BUILT-UP ASPHALT ROOFING HOT PROCESS
07600 FLASHING AND SHEETMETAL
07920 SEALANTS AND CALKINGS

DIVISION 09 - FINISHES

09915 PAINTING

DIVISION 13 - SPECIAL CONSTRUCTION

13281 ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS
13282 LEAD PAINT ABATEMENT

-- End of Project Table of Contents --

SECTION 01110

SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY

The work to be performed under this project consists of providing the labor, equipment, and materials to remove the existing roofing systems, including insulation, installing new insulation and built-up roof systems and performing tuck-pointing of existing brick joints on Buildings 4, 7, 8, 11, 12, 24, 34, 35-1, 53, 54 and 95. The work is separated into a base bid and several options. The project is located at the NASSA Glenn Research Center, 21000 Brookpark Road, Cleveland, Ohio 44135.

1.1.1 New Work Description (Base Bid)

Remove existing gravel, multi-ply roofing membranes, flashing, and insulation to existing roof deck, and install new insulation, multi-ply roofing membranes, flood coat and gravel on Buildings 4, 8, 12, 24, 34, and 54. Work includes the replacement of metal roof edges, wood blocking at perimeters and curbs, wood block equipment supports, installation of new equipment support rails, walk pads and metal flashing, tuck-pointing of existing masonry brick joints, removal of small roof curbs and closing up existing roof decking. Refer to each contact plan and detail drawing for specific scope of work.

New roofing system shall be cold or hot process application system. The Government shall select one system for all specified buildings based on available funding.

1.1.2 Optional Work

Optional item work is defined as additional work of major items of construction, which may at the Government option and under terms established by the schedule, be added to the requirements of the contract. The following are optional work items in no particular order for acceptance.

1.1.2.1 Option 1

Remove existing gravel, multi-ply roofing membranes, flashing, and insulation to existing roof deck, and install new insulation, multi-ply roofing membranes, flashing and gravel on Building 7. The work includes the replacement of metal roof edges, wood blocking, walk pads, metal flashing and tuck-pointing.

1.1.2.2 Option 2

Remove existing gravel, multi-ply roofing membranes, flashing, and insulation of existing roof deck, and install new insulation, multi-ply roofing membranes, flashing and gravel on Building 11. The work includes the replacement of metal roof edges, wood blocking, walk pads, metal flashing and tuck-pointing.

1.1.2.3 Option 3

Remove existing gravel, multi-ply roofing membranes, flashing, and insulation to existing roof deck, and install new insulation, multi-ply roofing membranes, flashing and gravel on Building 35-1. The work includes the replacement of metal roof edges, wood blocking, walk pads and metal flashing.

1.1.2.4 Option 4

Remove existing gravel, multi-ply roofing membranes, flashing, and insulation to existing roof deck, and install new insulation, multi-ply roofing membranes, flashing and gravel on Building 53. Work includes the caulking of parapet coping, metal flashing and the painting of West wing metal roof deck.

1.1.2.5 Option 5

Remove existing gravel, multi-ply roofing membranes, flashing and insulation to existing roof deck, and install new insulation, multi-ply roofing membranes, flashing and gravel on Building 95. Work includes the re-installation of metal roof edges.

1.2 REFERENCES (Not Applicable)

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-18 Records

Submit the following items to the Contracting Officer:

Utility Outages

1.4 CONTRACT DRAWINGS

The following drawings accompany this specification and are a part thereof.

<u>Drawing No.</u>	<u>Title</u>
<u>Base Bid:</u>	
CF 190973	Title Sheet
CF 156685	Building 4 Roof Plan (Flight Research Building)
CF 152298	Building 8 Roof Plan (Visitor Center)
CF 180201	Building 12 Roof Plan (Steam Plant)
CF 159754	Building 24 Roof Plan (Special Projects Laboratory)
CF 14476	Building 34 Roof Plan (Materials Research Laboratory)
CF 15738	Building 54 Roof Plan (8x6 Office and Control Building)
<u>Option 1:</u>	
CF 111644	Building 7 Roof Plan (Microwave Systems Laboratory)
<u>Option 2:</u>	
CF 190232	Building 11 Roof Plan (Icing Research Tunnel)

Option 3:

CF 191686 Building 35-1 Roof Plan (Research Combustion Laboratory)

Option 4:

CF 15733 Building 53 Roof Plan (8x6 Drive Building)

Option 5:

CF 120982 Building 95 Roof Plan (PSL Desiccant Air Dryer)

Detail Sheets for Base Bid and Options:

CF 190974	Architectural Roof Details
CF 190975	Architectural Roof Details
CF 190976	Architectural Roof Details
CF 190976A	Typical Architectural Isometric Roof Details
CF 190970	Architectural Roof Details
CF 190971	Architectural Roof Details
CF 190972	Architectural Roof Details

Reference publications will not be furnished.

Contractor shall purchase sets of drawings from source identified in Bid Solicitation.

Contractor shall immediately check furnished drawings and notify the Government of any discrepancies.

1.5 WORK RESCHEDULING

Normal duty hours for work shall be from 7:30 a.m. to 5:00 p.m., Monday through Friday. Requests for additional work shall require written approval from the Contracting Officer 3 days in advance of the proposed work period.

1.6 WORK SCHEDULING

The Contractor shall telephone the Contracting Officer's Technical Representative each morning between 8:00 a.m. and 8:30 a.m. and report the following:

Themselves
 Company name and contact
 Work Area
 Number of personnel on the job

The Contractor shall require each subcontractor to comply with the above requirements in the Contractor's absence.

1.7 OCCUPANCY OF PREMISES

Buildings will be occupied during performance of work under this Contract. Occupancy notifications will be posted in a prominent location in the work area.

Before work is started, the Contractor shall arrange with the Contracting Officer a sequence of procedure, means of access, space for storage of materials and equipment, and use of approaches, corridors, and stairways.

Existing means of egress shall be maintained.

1.8 ON-SITE PERMITS

1.8.1 Utility Outages and Connections

Work shall be scheduled to hold outages to a minimum.

Utility outages and connections required during the prosecution of work that affect existing systems shall be arranged for at the convenience of the Government and shall be scheduled outside the regular working hours or on weekends.

Contractor shall not be entitled to additional payment for utility outages and connections required to be performed outside the regular work hours.

Requests for utility outages and connections shall be made in writing to the Contracting Officer at least 15 working days in advance of the time required. Each request shall state the system involved, area involved, approximate duration of outage, and the nature of work involved.

1.9 METRIC PROJECT

This project has been designed with the International System of Units (SI), otherwise known as metric units. Most projects specified are the same products contractors are currently using, only specified in metric dimensions. All hard metric products used are specifically identified. Contractors are cautioned that they should ask suppliers about delivery schedules on hard metric products and not assume they are the same as inch-dimensioned ones.

All correspondence shall use SI metric units exclusively. All cost data submitted by the contractor in a proposal or any other submission shall be in metric units. All shop drawings, catalog cuts, and submittals shall be submitted with metric units and dimensions that clearly demonstrate conformance with the metric units given in the drawings and specifications.

Metric supplements to existing project literature or data will be accepted on bond paper.

All operations and maintenance (O&M) material shall be submitted with metric units and dimensions that clearly demonstrate conformance. Metric supplements to existing O&M material shall be accepted on bond paper.

All meetings and presentations which involve discussion of measurements or units shall be conducted in SI units.

PART 2 PRODUCTS

2.1 PROPRIETARY NAMES

Whenever a proprietary name or product, or the name of a particular manufacturer or vendor, is specified by the Government, the salient features mentioned shall be understood as establishing the Government's minimum requirements for type, function, dimension, appearance, and quality desired. Proprietary named or "equal" products being offered, including products of the brand name manufacturer other than the one described by proprietary name, will be considered if the products are clearly identified and are determined by the Government to meet fully the salient characteristics requirements referenced in the specifications and drawings.

Other manufacturer's products will be accepted provided sufficient information is submitted to allow the Government to determine that products

proposed are equivalent to those named.

PART 3 EXECUTION

3.1 GENERAL

3.1.1 Schedule Requirements

After the Notice to Proceed (NTP) is issued, and before the Contractor submits a detailed construction schedule, a meeting shall be held between the Contractor, COTR, Project Manager, Abatement Contractor, and the Building Manager. The purpose of this meeting is to discuss the coordination and implementation of the construction, any impacts to building personnel, and any special issues/concerns. The Contractor shall then incorporate this information into the construction schedule and submit the detailed schedule to the COTR for approval.

The Contractor shall be responsible for cleanup of dust and debris at the conclusion of each working day as approved by the COTR.

3.2 SEQUENCE OF WORK

The contractor shall perform the roofing work during the most optimal time frame during the year for this type of work. The Government estimates that the best time of the year for roofing work is between the months of April and December. Therefore, the Contractor shall perform the base bid work (Buildings 4, 8, 12, 24, 34, and 54) between April 1, 2004 and December 1, 2004. After the completion of these roofs, the Contractor shall perform the optional work (Buildings 7, 11, 35-1, 53 and 95) between April 1, 2005 and December 1, 2005.

The Contractor shall proceed with one building roof at a time until all the roofs are complete. The Contractor shall be permitted to proceed with two building roofs concurrently due to an excessive amount of poor weather days during the calendar year.

The Contractor shall submit a schedule indicating the sequence of work, identifying the buildings that will be re-roofed during each calendar year.

The research operations in the various Test Tunnels and the Research Test Cells will continue throughout the years of 2004 and 2005. The Contractor shall meet with the Government COTR and research personnel to arrange the sequence of work on Research Buildings 11, 24, 34, 53 and 95 in order not to interfere with research operations.

3.3 TEMPORARY PROTECTION

The Contractor shall submit for the COTR's review a Temporary Protection Plan, showing the means and locations of protection of existing facilities and equipment necessary to perform the work.

3.4 GOVERNMENT DISPOSAL

The following is a list of material that the Government will dispose:

Flaking lead paint shall be double bagged and turned over to the Government for disposal.

3.5 OWNER ACCEPTANCE

Construction shall begin after the Notice to Proceed.

When the Contractor considers the construction to be substantially complete, the Contractor shall notify the Government in writing.

If the Government considers the construction substantially complete, the final inspection and acceptance process will begin.

After the final acceptance of process is complete, the Government will take occupancy.

-- End of Section --

SECTION 01315

PROJECT MEETINGS

PART 1 GENERAL

1.1 SUMMARY

The requirements of this Section apply to, and are a component part of, each section of the specifications.

1.2 REFERENCES (Not Applicable)

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-01 Data

A Project Submittal Schedule shall be submitted showing full coordination with the project schedule. All products and tests under each submittal number shall be prioritized and linked to the progress schedule.

1.4 PRECONSTRUCTION CONFERENCE

The Contractor shall attend a preconstruction conference scheduled by the Contracting Officer. Work shall not commence prior to the conference. Subcontractor representatives shall attend.

Discussion shall address project orientation, personnel contact, safety issues, permits, deficiencies, and the location of the Contractor's office.

1.5 PROJECT MEETINGS

The Contractor shall attend pre-construction and closeout meetings scheduled by the Government. Subcontractor representatives shall attend.

Discussion shall address the progress schedule, potential factors of delay, deficiencies, material delivery schedules, submittals, and safety issues.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 01330

SUBMITTALS

PART 1 GENERAL

1.1 SUMMARY

Requirements of this Section apply to, and are a component part of, each section of the specifications.

1.2 REFERENCES (Not Applicable)

1.3 SUBMITTALS

A standard transmittal form provided by the Government shall be used to transmit each submittal.

Submittal Description (SD): Drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials to be furnished by the Contractor explaining in detail specific portions of the work required by the contract.

The following items, SD-01 through SD-19, are descriptions of data to be submitted for the project. The requirements to actually furnish the applicable items will be called out in each specification.

SD-01 Data

Submittals which provide calculations, descriptions, or other documentation regarding the work.

SD-02 Manufacturer's Catalog Data

Data composed of catalog cuts, brochures, circulars, specifications and product data, and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents.

SD-04 Drawings

Submittals which graphically show relationship of various components of the work, schematic diagrams of systems, detail of fabrications, layout of particular elements, connections, and other relational aspects of the work.

SD-06 Instructions

Preprinted material describing installation of a product, system, or material, including special notices and material safety data sheets, if any concerning impedances, hazards, and safety precautions.

SD-08 Statements

A document, required of the Contractor, or through the Contractor by way of a supplier, installer, manufacturer, or other Lower Tier Contractor, the purpose of which is to further the quality or orderly progression of a portion of the work by documenting procedures,

acceptability of methods or personnel, qualifications, or other verification of quality.

SD-09 Reports

Reports of inspections and laboratory tests, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

SD-13 Certificates

Statements signed by responsible officials of a manufacturer of a product, system, or material attesting that the product, system or material meet specified requirements. Statements must be dated after the award of this contract, name the project, and list the specific requirements which it is intended to address.

SD-14 Samples

Samples, including both fabricated and unfabricated physical examples of materials, products, and units of work as complete units or as portions of units of work.

SD-18 Records

Documentation to ensure compliance with an administrative requirement or to establish an administrative mechanism.

1.4 PREPARATION

1.4.1 Marking

Permanent marking shall be provided on each submittal to identify it by contract number; transmittal date; Contractor's, Subcontractor's, and supplier's name, address(es) and telephone number(s); submittal name; specification or drawing reference; and similar information to distinguish it from other submittals. Submittal identification shall include space to receive the review action by the Contracting Officer.

1.4.2 Drawing Format

Drawing submittals shall be prepared on translucent, reproducible sheets, not less than 210 by 297 millimeter nor larger than 841 by 1189 millimeter in size, except for full size patterns or templates. Drawings shall be prepared to accurate size, with scale indicated, unless other form is required. Drawing reproducibles shall be suitable for microfilming and reproduction on the Diazo or Ozalid machines and shall be of a quality to produce clear, distinct lines and letters. Drawings shall have dark lines on a white background.

Copies of each drawing shall have the following information clearly marked thereon:

- a. Job name, which shall be the general title of the contract drawings.
- b. Date of the drawings and revisions.

- c. Name of Contractor.
- d. Name of Subcontractor.
- e. Name of the item, material, or equipment detailed thereon.
- f. Number of the submittal (e.g., first submittal, etc.) in a uniform location adjacent to the title block.
- g. Government contract number shall appear in the margin, immediately below the title block.

Drawings shall be numbered in logical sequence. Contractor may use his own number system. Each drawing shall bear the number of the submittal in a uniform location adjacent to the title block. Government contract number shall appear in the margin, immediately below the title block, for each drawing.

A blank space shall be reserved on the right hand side of each sheet for the Government disposition stamp.

1.4.3 Data Format

Required data submittals for each specific material, product, unit of work, or system shall be collected into a single submittal and marked for choices, options, and portions applicable to the submittal. Marking of each copy of product data submitted shall be identical. Partial submittals will not be accepted for expedition of construction effort.

1.4.4 Samples

Samples shall be physically identical with the proposed material or product to be incorporated in the work, fully fabricated and finished in the specified manner, and full scale. Where variations in color, finish, pattern, or texture are inherent in the material or product represented by the sample, multiple units of the sample, showing the near-limits of the variations and the "average" of the whole range (not less than 3 units), shall be submitted. Each unit shall be marked to describe its relation to the range of the variation. Where samples are specified for selection of color, finish, pattern, or texture, the full set of available choices shall be submitted for the material or product specified. Sizes and quantities of samples shall represent their respective standard unit.

1.5 SUBMISSION REQUIREMENTS

1.5.1 Schedules

Within 15 days of notice to proceed, the Contractor shall provide, for approval by the Contracting Officer, the following schedule of submittals:

- a. A schedule of shop drawings and technical submittals required by the specifications and drawings. Schedule shall indicate the specification or drawing reference requiring the submittal; the material, item, or process for which the submittal is required; the "SD" number and identifying title of the submittal; the Contractor's anticipated submission date and the approval need date.
- b. A separate schedule of other submittals required under the

contract but not listed in the specifications or drawings. Schedule will indicate the contract requirement reference; the type or title of the submittal; the Contractor's anticipated submission date and the approved need date (if approval is required).

- c. Submittals called for by the contract documents will be listed on one of the above schedules. If a submittal is called for but does not pertain to the contract work, the Contractor shall include it in the applicable schedule and annotate it "N/A" with a brief explanation. Approval of the schedules by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the schedules or marked "N/A".
- d. Copies of both schedules shall be re-submitted monthly annotated by the Contractor with actual submission and approval dates. When all items on a schedule have been fully approved, no further re-submittal of the schedule is required.

1.5.2 Drawings Submittals

Five blackline or blue-line opaque print(s) of each drawing shall be submitted. Two prints, marked with review notations by the Contracting Officer, will be returned to the Contractor.

1.5.3 Data Submittals

Five complete sets of indexed and bound product data shall be submitted. Two sets, marked with review notations by the Contracting Officer, will be returned to the Contractor.

1.5.4 Samples

One set of identified samples shall be submitted. A copy of the transmittal form, marked with review notations including selections by the Contracting Officer, will be returned to the Contractor.

Samples that are intended or permitted to be returned and actually incorporated in the work are so indicated in the individual technical sections. These samples will be returned to the Contractor, at his expense, to be clearly labeled, with installation location recorded. Samples shall be in undamaged condition at the time of installation.

Where mockups and similar large samples are required by individual technical sections, it is recognized that these are a special type of sample which cannot be readily "transmitted" as specified for submittal of samples. Otherwise, and except as indicated in the individual technical sections, the requirements for samples shall be complied with and a transmittal form shall be processed for each mockup, to provide a record of the activity.

1.6 GOVERNMENT'S REVIEW

1.6.1 Review Notations

Contracting Officer will review submittals and provide pertinent notation within 15 calendar days after date of submission. Submittals will be returned to the Contractor with the following notations:

- a. Submittals marked "approved" authorize the Contractor to proceed with the work covered.
- b. Submittals marked "approved as noted" authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections. Notes shall be incorporated prior to submission of the final submittal.
- c. Submittals marked "return for correction" require the Contractor to make the necessary corrections and revisions and to re-submit them for approval in the same routine as before, prior to proceeding with any of the work depicted by the submittal.
- d. Submittals marked "not approved" or "disapproved" indicate noncompliance with the contract requirements and shall be re-submitted with appropriate changes. No item of requiring a submittal shall be accomplished until the submittals are approved or approved as noted.
- e. Contractor shall make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the clause entitled, "Changes" shall be given to the Contracting Officer. Approval of the submittals by the Contracting Officer shall not be construed as a complete check, but will indicate only that the general method of construction and detailing is satisfactory. Contractor shall be responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.
- f. If changes are necessary to approved submittals, the Contractor shall make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change shall be accomplished until the changed submittals are approved.

1.6.2 Sample Approval

Contractor shall furnish, for the approval of the Contracting Officer, samples required by the specifications or by the Contracting Officer. Shipping charges shall be paid by the Contractor. Materials or equipment requiring sample approval shall not be delivered to the site or used in the work until approved in writing by the Contracting Officer.

Each sample shall have a label indicating:

- a. Name of project
- b. Name of Contractor
- c. Material or equipment
- d. Place of origin
- e. Name of producer and brand

- f. Specification section to which samples applies
- g. Samples of furnished material shall have additional markings that will identify them under the finished schedules.

Contractor shall submit to the Contracting Officer two samples of materials where samples are requested. Contractor shall transmit with each sample a letter, original and two copies, containing the above information.

Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any contract requirements. Before submitting samples, the Contractor shall assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Materials and equipment incorporated in the work shall match the approved samples. If requested, approved samples, including those which may be damaged in testing, will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material. Government reserves the right to disapproved any material or equipment which previously has proved unsatisfactory in service.

Variations from contract requirements shall be specifically pointed out in transmittal letters. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Contractor shall replace such materials or equipment to meet contract requirements.

Approval of the Contractor's samples by the Contracting Officer shall not relieve the Contractor of his responsibilities under the contract.

1.7 PROGRESS SCHEDULE

1.7.1 Bar Chart

Contractor shall:

- a. Submit the progress chart, for approval by the Contracting Officer, at the Preconstruction Conference in one reproducible and 4 copies.
- b. Prepare the progress chart in the form of a bar chart utilizing form "Construction Progress Chart" or comparable format acceptable to the Contracting Officer.
- c. Include no less than the following information on the progress chart:

- (1) Break out by major headings for primary work activity.
 - (2) A line item break out under each major heading sufficient to track the progress of the work.
 - (3) A line item showing contract finalization task which includes punch list, clean-up and demolition, and final construction drawings.
 - (4) A materials bar and a separate labor bar for each line item. Both bars will show the scheduled percentage complete for any given date within the contract performance period. Labor bar will also show the number of men (man-load) expected to be working on any given date within the contract performance period.
 - (5) The estimated cost and percentage weight of total contract cost for each materials and labor bar on the chart.
 - (6) Separate line items for mobilization and drawing submittal and approval. (These items are to show no associated costs.)
- d. Update the progress schedule in one reproduction and 4 copies every 30 days throughout the contract performance period.

1.8 STATUS REPORT ON MATERIALS ORDERS

Within 5 days after notice to proceed, the Contractor shall submit, for approval by the Contracting Officer, an initial status report on materials orders. This report will be updated and re-submitted every 7 days as the status on material orders changes.

Report shall list, in chronological order by need date, materials orders necessary for completion of the contract. The following information will be required for each material order listed:

- a. Material name, supplier, and invoice number.
- b. Bar chart line item or CPM activity number affected by the order.
- c. Delivery date needed to allow directly and indirectly related work to be completed within the contract performance period.
- d. Current delivery date agreed on by supplier.
- e. When item d exceeds item c, the effect that delayed delivery date will have on contract completion date.
- f. When item d exceeds item c, a summary of efforts made by the Contractor to expedite the delayed delivery date to bring it in line with the needed delivery date, including efforts made to place the order (or subcontract) with other suppliers.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 01411

GENERAL SAFETY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

The requirements of this Section apply to, and are a component part of, each section of the specifications.

1.2 REFERENCES

The publications listed below form a part of this section to the extent referenced:

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910	(1996) Occupational Safety and Health Standards
29 CFR 1926	(1996) Safety and Health Regulations for Construction

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-08 Statements

Statements shall be submitted for the following items in accordance with paragraphs entitled, "Safety Plan" and "Protection Plan," of this section.

Safety Plan
Protection Plan

SD-13 Certificates

License Certificates for Radiation Materials and Equipments shall be submitted by the Contractor for all specialized material and equipment that could cause fatal harm to construction personnel or to the construction project.

SD-18 Records

Records shall be submitted in accordance with paragraph entitled, "Gas Protection," of this section.

1.3.1 Safety Plan

Contractor shall submit a site specific safety plan to the Contracting Officer for approval within 15 calendar days after notice to proceed. Compliance to the safety plan will be met. Copy of the approved document shall be made available at the Contractor's field office upon request from

personnel working at the site. This document shall also be available to the Contracting Officer's Technical Representative and representatives of the Safety Assurance Office.

Safety plan shall include, as a minimum, the following:

- a. Safety program objectives.
- b. Methods to attain safety objectives.
- c. Responsibility of key personnel for the Contractor.
- d. Safety meetings, surveys, inspections, and reports.
- e. Disaster and emergency programs.
- f. Lists of key personnel to be contacted in times of emergency.
- g. Program to show compliance with Federal OSHA Safety and Health Standards 29 CFR 1910 and 29 CFR 1926.
- h. Methods to comply with the requirement for immediate reporting of accidents to the Contracting Officer.
- i. Statement that the Contractor will not invalidate the integrity of safety systems without proper authorization.
- j. Procedures for emergency actions to be taken to secure dangerous conditions, to protect personnel, and secure work areas in the event of accident or an act of nature.
- l. Procedures for securing the accident site so that the area remains secure until arrival of a safety investigator. Accident site will remain secured until released by the Contracting Officer.
- m. Provide MSDS sheets for all hazardous materials which will be used. Methods for handling and storage shall be identified.

1.3.2 Protection Plan

Structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations shall be protected against damage.

1.4 GENERAL SAFETY PROVISIONS

Contractor shall take safety and health measures in performing work under this Contract. Contractor shall meet with the Contracting Officer to develop a mutual understanding relative to administration of the safety plan. Contractor is subject to applicable federal, state, and local laws, regulations, ordinances, codes, and orders relating to safety and health in effect on the date of this Contract.

During the performance of work under this Contract, the Contractor shall comply with procedures prescribed for control and safety of persons visiting the project site. Contractor is responsible for his personnel and for familiarizing each of his subcontractors with safety requirements. Contractor shall advise the Contracting Officer of any special safety restriction he has established so that Government personnel can be notified of these restrictions.

1.5 SAFETY LOCKOUT/TAGOUT PROCEDURES

Contractor shall ensure that each employee is familiar with and complies with these procedures and 29 CFR 1910.147.

Contracting Officer will, at the Contractor's request, apply lockout/tagout tags and take other actions that, because of experience and knowledge, are known to be necessary to make the particular equipment safe to work on.

No person, regardless of position or authority, shall operate any switch, valve, or equipment that has an official lockout/tagout tag attached to it, nor shall such tag be removed except as provided in this section.

No person shall work on any equipment that requires a lockout/tagout tag unless he, his immediate supervisor, project leader, or a subordinate has in his possession the stubs of the required lockout/tagout tags.

When work is to be performed on electrical circuits, the work shall be performed only by personnel qualified observing the required safety clearance.

A supervisor who is required to enter an area protected by a lockout/tagout tag will be considered a member of the protected group provided he notifies the holder of the tag stub each time he enters and departs from the protected area.

Identification markings on building light and power distribution circuits shall not be relied on for established safe work conditions.

Before clearance will be given on any equipment other than electrical (generally referred to as mechanical apparatus), the apparatus, valves, or systems shall be secured in a passive condition with the appropriate vents, pins, and locks.

Pressurized or vacuum systems shall be vented to relieve differential pressure completely.

Vent valves shall be tagged open during the course of the work.

Where dangerous gas or fluid systems are involved, or in areas where the environment may be oxygen deficient, system or areas shall be purged, ventilated, or otherwise made safe prior to entry.

1.5.1 Tag Placement

Lockout/tagout tags shall be completed in accordance with the regulations printed on the back thereof and attached to any device which, if operated, could cause an unsafe condition to exist.

If more than one group is to work on any circuit or equipment, the employee in charge of each group shall have a separate set of lockout/tagout tags completed and properly attached.

When it is required that certain equipment be tagged, the Government will review the characteristics of the various systems involved that affect the safety of the operations and the work to be done; take the necessary actions, including voltage and pressure checks, grounding, and venting, to make the system and equipment safe to work on; and apply such

holdofflockout/tagout tags to those switches, valves, vents, or other mechanical devices needed to preserve the safety provided. This operation is referred to as "Providing Safety Clearance."

1.5.2 Tag Removal

When any individual or group has completed its part of the work and is clear of the circuits or equipment, the supervisor, project leader, or individual for whom the equipment was tagged shall turn in his signed lockout/tagout tag stub to the Contracting Officer. That group's or individual's lockout/tagout tags on equipment may then be removed on authorization by the Contracting Officer.

1.6 ACCIDENT TREATMENT AND RECORDS

Contractor shall post emergency first aid and ambulance information at project site.

Contractor employees may utilize Government dispensary facilities located in Building 15 for injury and emergency medical treatment. Such treatment shall be recorded by the Contractor on form 1627, Mishap Report. Contact the Safety Assurance Office. (Telephone (216) 433-8848)

1.7 FIRE PREVENTION AND PROTECTION

Open-flame heating devices will not be permitted except by approval in writing from the Contracting Officer. Approval for the use of open fires and open-flame heating devices will not relieve the Contractor from the responsibility for any damage incurred because of fires.

Burning trash, brush, or wood on the project site shall not be permitted.

1.8 USE OF EXPLOSIVES

Explosives shall not be used or brought to the project site without prior written approval from the Contracting Officer. Such approval shall not relieve the Contractor of responsibility for injury to persons or for damage to property due to blasting operations.

Storage of explosives, when permitted on Government property, shall be only where directed and in approved storage facilities. These facilities shall be kept locked at all times except for inspection, delivery, and withdrawal of explosives.

1.9 ELECTRICAL

Contractor shall appoint an individual responsible for the electrical safety of each work team to restrict entry to dangerous locations to those authorized by him jointly with the Government.

1.10 FACILITY OCCUPANCY CLOSURE

Streets, walks, and other facilities occupied and used by the Government shall not be closed or obstructed without written permission from the Contracting Officer.

1.11 ROOFING AND COATING

At the beginning of each work day the Contractor shall check with the

Contracting Officer before proceeding to work on the roof to ensure safe work conditions.

1.12 WELDING, FLAME CUTTING, AND MELTING

Contractor shall clear welding and cutting operations with the Contracting Officer before operations begin.

Contractor shall discontinue burning, welding, or cutting operations 1 hour prior to the end of the normal work day. A workman shall remain at the site for 1 hour after discontinuing these operations to make thorough inspection of the area for possible sources of latent combustion. He shall be equipped with two full 6.8 kilogram carbon dioxide fire extinguishers. Any unsafe conditions shall be reported to the Safety Assurance Office. (Telephone: (216) 433-3057)

During operations involving possible fire hazard, the Contractor shall notify the Contracting Officer and not proceed until clearance is obtained in writing. Contracting Officer may request a standby from the Fire Station. This requirement does not relieve the Contractor of his responsibility for welding and cutting safety.

1.13 HIGH NOISE LEVEL PROTECTION

Operations performed by the Contractor that involve the use of equipment with output of high noise levels (jackhammers, air compressors, and explosive device activated tools) shall be scheduled for after duty working hours during the hours. Use of any such equipment shall be approved in writing by the Contracting Officer prior to commencement of work.

The Contractor shall comply with 29 CFR 1910.95, the OSHA standard on Occupational Noise Exposure. In addition, employees of the Contractor and its subcontractors shall wear personal hearing protection when exposed to noise that exceeds 85 dB(A), regardless of the intended or actual duration of exposure. The Contractor shall provide all employees and subcontractors assigned to this project with personal hearing protection, which shall have a Noise Reduction Rating (NRR) sufficient to reduce noise to a maximum of 85 dB(A), determined per OSHA methods. This requirement shall apply to continuous, intermittent, and impact noise that is generated by any NASA or Contractor-owned equipment or facility. The Contractor shall be responsible for enforcing the compliance of all employees and subcontractors.

If the Contractor cannot or does not provide personal hearing protection sufficient to reduce noise to a maximum of 85 dB(A), then administrative controls shall be implemented to limit employee noise exposure to a maximum time-weighted-average (TWA) level of 85 dB(A) (TWA), determined using a 5 dB exchange rate.

It is the Contractor's responsibility to monitor noise levels of its own operations for the purpose of determining personal hearing protection requirements. NASA will provide LeRC facility noise level information on request. Personal hearing protection requirements shall be determined on the basis of the highest noise level to which employees can reasonably be expected to be exposed.

Contractors working outdoors or in buildings known to have high noise operations shall have personal hearing protection equipment on their person at all times.

Contractor health and safety plans shall indicate personal hearing protection selections, including NRR, and any administrative controls that will be implemented to meet the default 85 dB(A) (TWA) noise exposure limit.

1.14 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor shall:

- a. Secure outside equipment and materials and place materials possible to damage in protected locations.
- b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.
- c. Ensure that temporary erosion controls are adequate.

1.15 HAZARDOUS WASTE

Contractor shall identify all wastes produced and dispose of them in the following approved manners:

Identify all wastes and waste producing processes including chemicals, paints, POL products and solvents, and their containers. Unknown wastes will be chemically identified by the Government.

Obtain a determination of whether the waste is hazardous from the Contracting Officer.

Notify the Contracting Officer prior to taking disposal action for any hazardous waste.

For disposal, provide either laboratory analysis data documenting the chemical content of the waste or certification by appropriate organization authority as to the chemical constituents of the waste. Technical assistance on disposal analysis requirements will be provided on request by contacting the Contracting Officer.

Document the waste type, quantity, location, and personnel/contractor/agency responsible so the material can be tracked from generation through ultimate disposal as required by Environmental Protection Agency under Resource Conservation and Recovery Act.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SUMMARY

The requirements of this Section apply to, and are a component of, each section of the specifications.

1.2 REFERENCES (Not Applicable)

1.3 SUBMITTALS (Not Applicable)

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 TEMPORARY UTILITIES

The Contractor shall provide temporary utilities required for construction. Materials may be new or used, shall be adequate for the required usage, shall not create unsafe conditions, and shall not violate applicable codes and standards.

3.1.1 Electricity

Contractor shall provide connections, sized to provide service required for power and lighting. Feeder and branch wiring with area distribution boxes shall be located so that power is available throughout the project site by use of power cords. 120/240 and 480 electrical volt feeder service is available. Lighting shall be provided by the Contractor. Electricity used will be furnished by the Government.

3.1.2 Water

Contractor shall make connections to existing facilities to provide water for construction purposes. Water used will be furnished by the Government.

3.1.3 Telephone Service

Contractor shall provide telephone service. The Contractor shall pay costs of service.

3.1.4 Sanitary Facilities

Contractor shall provide temporary sanitary facilities and shall service, clean, and maintain these facilities and enclosures. Temporary facilities shall be removed from the site at the completion of the work.

3.1.5 Fire Protection

The Contractor shall provide temporary fire protection equipment for the protection of personnel and property during construction. Debris and flammable materials shall be removed daily to minimize potential hazards.

3.2 SIGNS

3.2.1 Construction Sign

Within 30 days after notice to proceed, the Contractor shall install the construction identification sign at the location designated by the Contracting Officer.

3.2.2 Other Signs and Advertisements

Only signs necessary to expedite deliveries, maintain traffic flow, promote safety (e.g. caution, danger, blasting, hardhat area), and prevent interference with Government operations shall be erected.

3.3 TRAFFIC PROVISIONS

3.3.1 Maintenance of Traffic

The Contractor shall conduct his operations in a manner that will not close any thoroughfare or interfere in any way with traffic on railways or highways except with written permission of the Contracting Officer. The Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the highway authority have been met.

Work shall be conducted so as to minimize obstruction of traffic, and traffic shall be maintained on at least half of the roadway width at all times. Approval shall be obtained from the Contracting Officer prior to starting any activity that will obstruct traffic.

The Contractor shall provide, erect, and maintain, at his own expense, lights, barriers, signals, passageways, detours, etc., that may be required.

3.3.2 Rush Hour Restrictions

The Contractor shall not interfere with the peak traffic flows preceding and during normal operations from 7:00 a.m. to 5:00 p.m. without notification to and approval by the Contracting Officer.

3.3.3 Dust Control

The Contractor's dust control methods and procedures shall be approved by the Contracting Officer. Dust abatement on access roads shall be treated with applications of calcium chloride, water sprinklers, or similar methods or treatment.

3.4 TEMPORARY STRUCTURES

Contractor owned or leased trailers shall be identified with the name and phone number of the contractor. Size and location of the signage shall be approved by the Contracting Officer.

Temporary offices and sheds shall comply with NFPA 241.

3.5 PROTECTION OF EXISTING SYSTEMS

3.5.1 Utility

Connection to existing utilities, identified on the drawings to the Contractor, shall be protected from damage during construction activity.

3.5.2 Safety

The Contractor shall protect the integrity of any installed safety systems or personnel safety devices.

If entrance into systems serving safety devices is required, the Contractor shall obtain prior approval from the Contracting Officer. If it is temporarily necessary to remove or disable personnel safety devices in order to accomplish contract requirements, the Contractor shall provide alternative means of protection prior to removing or disabling any permanently installed safety devices or equipment and shall obtain prior approval from the Contracting Officer.

-- End of Section --

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

Requirements of this Section apply to, and are a component part of, each section of the specifications.

1.2 REFERENCES (Not Applicable)

1.3 SUBMITTALS (Not Applicable)

1.4 SHIPMENT AND PROTECTION OF MATERIAL AND EQUIPMENT

Shipments shall be addressed to the Contractor who shall be responsible for their receipt, unloading, handling, and storage at the site. Government will not accept deliveries on behalf of the Contractor or his subcontractors or assume responsibility for security of materials, equipment, or supplies delivered to the site.

Contractor shall protect and preserve materials, supplies, and equipment of every description (including property which may be Government-furnished or -owned) and work performed.

1.5 STORAGE AND PROTECTION OF MATERIAL

1.5.1 Salvage Material

Material to be salvaged and reinstalled by the Contractor shall be protected during removal and stored to prevent damage.

1.5.2 New Material and Construction Equipment

Only material and construction equipment designated for performance of contract work may be stored at the construction site or located in Government-controlled warehouses or shop facilities.

PART 2 PRODUCTS

2.1 MECHANICAL MATERIALS AND EQUIPMENT

Materials and equipment to be provided under this contract shall be standard catalogue products of manufacturers regularly engaged in the manufacture of the products.

Material and equipment shall be installed in accordance with the requirements of the contract drawings and approved recommendations of the manufacturers.

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 01780

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SUMMARY

The requirements of this Section apply to, and are a component part of, each section of the specifications.

1.2 REFERENCES (Not Applicable)

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-08 Statements

A Work Plan shall be submitted to the Contracting Officer for project closeout. Plan shall include all scheduled inspections, items, closeout dates for all functions, and shall list the required Government and Contractor personnel that will be taking part in these functions.

SD-20 Warranty

Contractor shall submit Contractor's warranty and manufacturer's roof system and roof material warranties for each building.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 02220

DEMOLITION

PART 1 GENERAL

1.1 REFERENCES (Not Applicable)

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-08 Statements

Contractor shall prepare and submit a detailed Demolition Plan of the work procedures and safety precautions to be used in the identification, demolition, handling, removal, transportation, and reclamation or disposal of removed materials. Contractor shall meet with the Contracting Officer, prior to beginning work, to discuss in detail the demolition plan.

SD-18 Records

Existing Conditions shall be recorded in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Such record shall contain the elevation of the top of foundation walls, the location and extent of cracks and other damage and description of surface conditions that exist prior to the start of work. Copies of the record shall be submitted and the stated conditions before starting work shall be verified.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 TEMPORARY UTILITY SERVICES

Contractor shall provide a minimum of 2 aviation red or high intensity white obstruction lights on temporary structures (including cranes) over 30 meter above ground level. Light construction and installation shall comply with FAA AC 70/7460-1. Lights shall be operational during periods of reduced visibility, darkness, and as directed by the Contracting Officer.

3.2 DEMOLITION AND REMOVAL WORK

3.2.1 Protective Measures

Existing construction shall not be disturbed beyond that indicated or necessary for installation of new work. Temporary shoring and bracing shall be provided for support of building components to prevent settlement or other movement.

Protective measures shall be provided to control accumulation and migration of dust and dirt in all areas of work. Dust, dirt, and debris shall be

removed from the areas of work daily.

3.2.2 Hazardous Materials

Main field built-up roofing membranes on Building 4 roofs and the wall and curb flashings on all building roofs have been tested positive for asbestos containing materials (ACM). Existing metal roof curb covers, mechanical support rail cap flashings, drain sump flashings and vent pipe flashings are coated with lead containing paint, or are slid lead materials. All roofing materials scheduled for demolition, that may contain asbestos or lead, shall be removed by roofing workers who have received appropriate training in compliance with Federal, State and Local regulations.

All asbestos containing roof membrane (Building 4) and membrane flashing material (ACM) shall be descended from roof through a metal chute to a covered roll-off container that is lined with 100 mil thick plastic. Contractor shall dispose of (ACM) roofing material at an approved solid waste landfill.

3.2.3 Salvageable Materials and Equipment

Government will designate materials and equipment to be salvaged.

Salvageable materials and equipment shall be removed in a manner that will cause the least possible damage thereto. Contractor personnel shall handle, store, and protect removed items that are to be reused in the work or are to be retained by the Government.

Identification tags shall be provided on items boxed or placed in containers, indicating the type, size, and quantity of materials.

3.2.4 Scrap Metal

Scrap metal shall become the Contractor's property and shall be removed from the site as it accumulates.

3.2.5 Buildings and Structures

Specified removal operations shall be performed in existing buildings as required to complete the work.

Carpentry:

Gypsum board, fiberboard, and other composition sheathing boards shall be classified as debris to be removed and disposed of.

Bolts, nuts, washers, timber connectors, and other rough hardware shall be classified as debris and disposed of.

3.2.6 Roofing

Government has had the built-up roofing and flashing materials tested. Test results showed that flashing materials contain asbestos.

Schedule roof demolition work to coincide with commencement of installation of new roofing system.

Remove no more roofing each day than can be replaced with new roofing that day to assure that roof remains watertight.

Contractor determines each day if weather conditions preclude performing any work and how much of flashing system is to be removed. Do not remove roofing membrane when weather conditions threaten integrity of building contents or intended continued occupancy.

Contractor is responsible for maintaining roof in a watertight condition at all times.

Coordinate work with structural, mechanical and electrical work associated with roof penetrations.

Maintain continuous temporary protection prior to and during installation of new roofing system.

Promptly repair damages caused to adjacent facilities by roofing removal work at no cost to Government.

Sweep roof surface clean of loose matter. Remove loose refuse and legally dispose of off site.

Cover and protect equipment to remain from sailing or damage when removal work is performed in areas adjacent to such items.

Prevent removed materials from entering roof drains, vent stacks, and similar items when removal work is performed in areas adjacent to such items.

Metal counter flashings are one piece assemblies and of copper. Bend them up out of way of removal work and new roofing installation.

Vacuum roofing gravel from roof surface.'

Remove roofing system to deck.

Rough lumber, wood blocking and wood cants shall be demolished and removed around building perimeters, walls, curbs and roof penetrations.

Remove all lead flashings around existing roof drains and vent stacks.

3.3 DISPOSAL OF REMOVED MATERIALS

3.3.1 General

Debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations shall be disposed of in accordance with all applicable federal, state and local regulations as contractually specified off the center. Removed materials shall not be stored on the project site.

3.3.2 Removal from Government Property

Waste materials shall be transported from Government property and legally disposed of.

-- End of Section --

SECTION 04200

MASONRY UNIT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 270 (1991) Standard Specification for Mortar for Unit Masonry

ASTM C 387 (1987) Standard Specification for Packaged, Dry Combined Materials for Mortar and Concrete

ASTM C 426 (1995) Standard Test Method for Drying Shrinkage of Concrete Block

ASTM C 91 (1995) Standard Specification for Masonry Cement

BRICK INSTITUTE OF AMERICA (BIA)

BIA Tech Note 20 (1990) Cleaning Brick Masonry

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-09 Reports

Test Reports shall be furnished for the following items in accordance with the paragraph entitled, "Sampling and Testing," of this section.

SD-14 Samples

Submit the following samples in sufficient numbers to show full range in color, texture, shapes and sizes (minimum of three each).

Mortar

1.3 SAMPLING AND TESTING

1.3.1 Testing Services

Laboratory testing and inspection service shall be provided as part of the work. Testing services shall be approved and shall include quality control sampling and testing of block masonry and mortar during construction.

1.3.2 Quality Control During Construction

Materials shall be sampled and tested for quality control during construction as follows:

<u>MATERIAL</u>	<u>REQUIREMENT</u>	<u>TEST</u>	<u>NUMBER/TESTS</u>
	Drying shrinkage	ASTM C 426	One set per project. Additional test when material or source changes
Mortar	Air entrainment	ASTM C 91	One test set for each 10,000 bricks or each 3,000 block masonry units
	Compressive strength	ASTM C 91	
	Water retention	ASTM C 91	

*Specified under paragraph entitled, "Quality."

1.3.3 Quality Control Reports

Testing service shall report test results in writing.

1.3.4 Evaluation of Test Results

Materials that do not conform to specifications shall be removed from the site.

When the tests indicate nonconformance, additional tests of units in the shipment shall be made. When 10 percent or more of the additional units tested also indicate nonconformance, the shipment will be rejected.

1.4 DELIVERY AND STORAGE

Cement materials shall be furnished in bags displaying the manufacturer's trademark and type. Material shall be dry and free of lumps when delivered. Upon delivery, material shall be stored in dry, weathertight, properly ventilated structures. Different brands or types of mortar shall be stored separately and shall not be intermixed.

Aggregates shall be stored and handled in such manner as to prevent intermixing with foreign matter.

1.5 PROTECTION OF MATERIALS AND WORK

Contractor shall protect materials from damage when stored and during construction.

PART 2 PRODUCTS

2.1 MORTAR

2.1.1 Mortar Materials

Mortar materials and proportions shall conform to ASTM C 270, with the following amendments:

Portland cement shall be Type I.

2.1.2 Types of Mortar

Type N mortar, as defined in Table 2 of ASTM C 270, shall be used.

2.1.3 Premixed Packaged Color Mortar

Mortar for facing brick and limestone joints shall be custom colored, premixed, packaged, dry, combined materials conforming to ASTM C 91. Mortar color shall match existing mortar color. Pigments shall be non-reactive, and color fast to sunlight, alkalies and weak acids.

2.1.4 Packaged Materials for Mortar and Concrete

Packaged, dry, combined materials for mortar and concrete shall conform to ASTM C 387, with the following amendments:

Cement materials shall be limited to portland cement, Type I.

Maximum size of coarse aggregate shall not exceed 19 millimeter.

Mortar shall be limited to Type N, ASTM C 270.

2.1.5 Admixtures for Mortar

Calcium chloride admixtures, antifreeze liquids, and salts shall not be used.

PART 3 EXECUTION

3.1 MASONRY WALLS

3.1.1 Mortar

Mortar shall be mixed in accordance with ASTM C 270.

Hand mixing, when permitted, shall be performed in a tight mortar mixing box. Mixing time shall be not less than that required to reproduce results obtained by machine mixing after the required amount of water has been added.

Mortar shall be used and placed in final position within 1-1/2 hours after mixing. Mortar not used within the specified time limit shall be discarded.

3.1.2 Joints

Except for joints to be calked or raked, all exposed joints shall be tooled evenly to a dense concave profile, with surface and edges compacted and sealed. Tooling shall be performed after joints are "thumbprint" hard.

Joints to be tuck pointed shall be raked out to a depth of 13 millimeter. Immediately before pointing, the joint shall be saturated with clean water and filled solidly with mortar.

3.2 POINTING AND CLEANING

Rake out loose mortar and tuck point existing masonry brick joints in walls located near the parapets of Buildings 4,7,8,11,12,34,100 and as indicated on the contract drawings. See Tuck Pointing and Stone Coping Sealant Schedule.

Remove metal joint covers and/or sealant from existing stone coping joints in masonry brick walls located near the parapets of Buildings 4,7, 8, 11, 12, 34, 100 and as indicated on the contract drawings. See Tuck Pointing and Stone Coping Sealant Schedule. (See Specification Section 07920, Sealants and Caulking.)

Masonry walls shall be dry brushed at the end of each day's work.

Upon completion of the work, holes and defects in exposed mortar joints shall be raked as required, filled with fresh mortar, and tooled.

After mortar is set and cured, mortar particles shall be removed with wood paddles, brushes, and scrapers before wetting the wall.

Brick masonry walls shall be cleaned in accordance with BIA Tech Note 20.

Detergent cleaning compound shall be type formulated to reduce metallic stains. Cleaning compounds shall be used in accordance with the manufacturer's instructions.

Glazed brick limestone units and prefaced masonry units shall be carefully wiped clean with a soft cloth immediately after laying. At completion of work, surfaces shall be given a final cleaning with water and a cleaning compound applied with a soft sponge or brush as recommended by the manufacturer.

3.3 TUCK POINTING AND STONE COPING SCHEDULE

Building	<u>Tuck Pointing Length of Joint</u>	<u>Coping Sealant Length of Joint</u>
4	32 meters	40 meters
7	47 meters	50 meters
8	61 meters	60 meters
11	25 meters	30 meters
12	29 meters	20 meters
24	None Required	None Required
34	41 meters	35 meters
35-1	None Required	None Required
53	20 meters	75 meters
54	65 meters	115 meters
95	None Required	None Required

-- End of Section --

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B18.22M (1981; R 1990) Metric Plain Washers

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM F 568 (1995) Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B18.2.3.8M (1981; R 1991) Metric Hex Lag Screws

AMERICAN WOOD PRESERVERS BUREAU (AWPB)

AWPB LP 2 (1988) Softwood Lumber, Timber and Plywood Pressure Treated with Water-Borne Preservatives for Aboveground Use

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA P5 (1994) Standards for Waterborne Preservatives

AWPA P8 (1991) Oil-Borne Preservatives

FEDERAL SPECIFICATIONS (FS)

FS FF-B-588 (Rev D) Bolt, Toggle; and Expansion Sleeve, Screw

FS FF-N-105 (Rev B; Int Am 4) Nails, Brads, Staples, and Spikes: Wire, Cut, and Wrought

FS FF-S-325 (Int Amd 3) Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry)

FS TT-W-571 (Rev J) Wood Preservation: Treating Practices

INDUSTRIAL FASTENER INSTITUTE (IFI)

IFI 502 (1982) Metric Tapping Screws

NATIONAL INSTITUTE FOR STANDARDS AND TECHNOLOGY (NIST)

NIST PS 20 (1970; Rev 1986) American Softwood Lumber Standards

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB 1001 (1994) Grading Rules

1.2 DELIVERY, HANDLING, AND STORAGE

Wood materials shall be securely bundled and shipped with adequate moisture-resistant covers to preclude damage by weather or handling during delivery, when stored, and during construction.

Wood materials that must be stored outdoors before immediate use shall be placed in orderly piles and stored on blocks above ground. Lumber shall be stored in stacks with provision for air circulation within stacks. Material shall be protected from the elements with moisture-resistant covers.

PART 2 PRODUCTS

2.1 WOOD MATERIALS

2.1.1 General Requirements

Each piece of framing lumber, board lumber, and plywood shall bear the trademark and grade identification of the manufacturer's association or the authorized inspection bureau under rules of which the lumber is manufactured and graded.

Softwood lumber shall be seasoned S4S and kiln-dried or air-dried to the specified moisture content. Dressed sizes shall conform to NIST PS 20.

Moisture content shall conform to the rules of the lumber association or the inspection bureau under which the lumber is graded but shall not exceed 15 percent for boards and dimensional lumber 50 millimeter or less in thickness.

2.1.2 Wood Blocking Materials

Wood blocking materials and studs over 3000 millimeter in length shall be of the following species:

Southern yellow pine No. 2 KD dimensions, SPIB 1001

2.1.3 Preservative Treated Lumber

The following wood members shall be pressure-preservative treated in accordance with FS TT-W-571 or AWPB LP 2. Each piece shall bear the AWPB stamp, indicating point of treatment, preservative symbol, symbol of standard, date of treatment, and moisture content after treatment:

Nailers that are set into, or are in contact with, concrete or masonry

Blocking and nailers for roof deck, sub fascia members, roof cants and saddles

Preservative shall be either water-borne, conforming to AWPA P5, or oil-borne conforming, to AWPA P8.

Nailers to receive membrane waterproofing and wood members to receive finish materials shall be treated with a water-borne preservative to eliminate preservative bleed-through at nails.

Wood treated with oil-borne preservatives shall be clean, free from surface oil, and properly seasoned for use.

Wood treated with water-borne preservatives shall be air-dried or kiln-dried to reduce maximum moisture content to 15 percent.

Cut surfaces of preservative-treated materials shall be brush coated with at least two coats of copper naphthenate as specified in AWPA P8.

Treated wood exposed in the final structure shall be free from objectionable odors and shall not be harmful or corrosive to adjacent materials or anchorages.

2.2 ANCHORAGE AND FASTENER MATERIALS

2.2.1 Nails and Staples

Nails, staples, and tacks shall conform to FS FF-N-105.

Nails for roof blocking, cants, and nailers shall be galvanized.

2.2.2 Bolts, Nuts and Screws

Bolts and nuts shall be carbon steel, galvanized, conforming to ASTM F 568, Class 4,8 or less.

Wood screws shall be carbon steel, galvanized, conforming to IFI 502.

Lag screws or lag bolts shall be commercial steel, galvanized, conforming to ASME B18.2.3.8M.

Expansion shields, expansion nails, and drive screw devices shall conform to FS FF-S-325.

Toggle bolts shall conform to FS FF-B-588.

Washers shall be carbon steel, galvanized, general assembly purpose type, conforming to ANSI B18.22M.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 General

Washers shall be provided under bolt heads or nuts in contact with wood. Lumber shall be bored to receive bolts.

Nailers, blocking, and furring shall be furnished in lengths that minimize joints.

3.1.2 Blocking and Nailers

Nailing strips, blocking and sub fascia wood members shall be continuous, cut with square ends and in maximum practical lengths.

For bolted connections, sub fascia members shall be fastened to structural steel members or concrete with 13 millimeter (1/2-inch) bolts at a maximum spacing of 1200 millimeter on center, one bolt near each end of the member.

Bolt heads shall be countersunk flush with the surface of the wood. Sub fascia members shall be held to a tolerance of 3 in 3000 millimeter.

Perimeter roof blocking and nailers shall be groove-cut to provide ventilation for insulation. Groove cuts shall be matched for continuity or new vent grooves cut when wide vents are built of more than one width of wood.

-- End of Section --

SECTION 07220

ROOF AND DECK INSULATION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 1289	(1995) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM C 208	(1995) Standard Specification for Insulation Boards (Cellulosic Fiber) Structural and Decorative
ASTM D 1621	(1979) Standard Test Method for Compressive Properties of Rigid Cellular Plastics
ASTM D 312	(1995) Asphalt Used in Roofing
ASTM D 41	(1994) Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-01 Data

Manufacturer's Catalog Data shall be submitted for the following items:

Thermal Insulation Materials
Deck Primer
Sheathing Paper
Fastening Materials
Insulation Adhesives

SD-06 Instructions

Manufacturer's Instructions for the following items shall indicate fastener and adhesive instructions for each type of installation. Also provide layout of insulation pattern for straight and tapered insulation.

Roof Insulation

SD-14 Samples

Contractor shall submit the following samples:

One piece of high-density fiber roof insulation, full thickness of 300 by 300 millimeters square.

One piece of rigid foam roof insulation, full thickness of 300 by 300 millimeters square.

1.3 QUALIFICATIONS FOR ROOF AND DECK INSULATION WORK

Work shall be performed by contractor personnel certified by the manufacturer for roof insulation (rigid board) applications and installations.

1.4 DELIVERY AND STORAGE OF MATERIALS

Materials shall be delivered to the project site in their original, unopened packages or containers bearing labels identifying the manufacturer's name, brand name, material, and other information.

Materials shall be stored in their original, unbroken packages or containers in a weathertight and dry area and protected from damage until needed for use.

PART 2 PRODUCTS

2.1 THERMAL INSULATION AND UNDERLAYMENT MATERIALS

2.1.1 Rigid Board

Underlayment (cover board) shall be 12 millimeter thick high density wood fiberboard complying with ASTM C 208, Grade 1, with a maximum thermal conductance value of 4.35 W/m² x degree C). Provide black organic-glass mat facer of all six sides. An acceptable product is Fesco Board as manufactured by Johns Manville, Inc. or equal.

Polyisocyanurate roof insulation shall conform to ASTM C 1289, Type II, with a maximum thermal conductance value of .57 (W/m² x degree C). Minimum compressive strength shall be 135 Kpa when tested according to ASTM D 1621.

Thickness for flat boards shall be minimum of 50 millimeters, unless otherwise indicated on the drawings. Top and bottom surfaces shall be covered with non-asphalt fiberglass mat facers. An acceptable product is Hy-Therm roof insulation as manufactured by Celotex Inc. or equal.

Provide tapered polyisocyanurate roof insulation boards where indicated for sloping to drain. Fabricate with minimum taper of 10 millimeters per meter, unless otherwise indicated on the drawings.

Provide tapered crickets formed from either polyisocyanurate or wood fiberboard for positive drainage to roof drains. Fabricate with minimum taper of 20 millimeters per meter, unless otherwise indicated on the drawings.

2.2 SHEATHING PAPER

Sheathing paper shall be used as the sheathing material over wood decks.

Sheathing paper shall be rosin-sized weighing not less than 2.5 kilogram per 10 square meter.

2.3 FASTENING MATERIALS

2.3.1 Roofing Nails

Roofing nails shall be corrosion-resistant spiral or annular ring shank, 12 gauge minimum, with integral 25 millimeter cap. Use roofing nails to fasten roofing felts to wood nailers.

2.3.2 Screw Type Fasteners

Screw fasteners shall be used for the installation of rigid insulation boards to metal and wood roof decks where allowed by manufacturer's specifications. Fastener shall be used in combination with insulation fastening plate.

Screw fasteners shall be SAE 1022, heat treated steel, with a thread size of 6.5 millimeters, 13 threads per 25 millimeters. Fasteners shall have symmetrical drill point with a #3 Phillips drive fastener head. Typical pullout force shall be approximately 180 kg in both new .75 millimeter steel deck, and 19 millimeter wood deck. Fasteners shall be corrosion coated to meet FM 4470 requirements.

2.3.3 Concrete Drive Fastener

Concrete fasteners shall be used for the installation of rigid insulation boards to concrete roof decks where allowed by manufacturer's specifications. Fasteners shall be used in combination with insulation fastening plate. Do not use fastener in concrete substrates that are less than 75 millimeters thick.

Concrete fasteners shall be AISI C-1038-1040, heat treated steel, with a core hardness of Rc 37-43, and a diameter of 6 millimeters. Fasteners shall be corrosion coated to meet FM 4470 requirements.

2.3.4 Insulation Fastening Plate

Fastening plates shall be used with screw or concrete drive fasteners for the installation of rigid roof insulation boards to various roof decks.

Plates shall be a minimum of 75 millimeters in diameter, .50 millimeters thick with a galvanized coating. Pull through resistance shall be approximately 180 kg.

Position fasteners on 1220 by 1220 millimeter square insulation boards in an FMRC-approved I-90 pattern or as allowed by the manufacturer's specifications.

2.3.5 Insulation Adhesives

Insulation adhesive shall be a one or two part solvent free, moisture curing, elastomeric asphalt insulation adhesive, specifically designed for adhering high density fiber board and crickets to rigid insulation.

The salient features of the insulation adhesive are as follows:

Property	Typical Value	Test Method
Asbestos content	None	EPA 600/R-93/116
Viscosity @ 25degC	70 Pa (70000 cP)	ASTM D 2554
Density @ 25deg C	1.0kg/L (8.4lb/gal)	ASTM D 1875
Nonvolatile matter	98%	ASTM D 1644
Tensile Strength @ 25deg C	200 psi (1379 kPa)	ASTM D 412
Adhesion Strength in Shear @ 25deg C.	80 psi (552 kPa)	ASTM D 816
Elongation (25deg C)	1200 %	ASTM D 412
VOC	<20 g/L	ASTM D 3960
Average T-Peel Strength	15 lbf (66N)	ASTM D 1876
Low Temp Flexibility	Pass at -60deg F (-51 deg C)	ASTM D 816

Acceptable manufacturers of insulation adhesives are listed below. Any other manufacturer of equal quality will be considered for use in this project.

Tremco, Incorporated Fas-n-free
 Soprema, Incorporated High Velocity Insulation Adhesive II
 Johns Manville MBR Cold Application Adhesive
 Firestone Building Products Company ISO Spray Insulation Adhesive

2.3.6 Insulation Joint Tape

A strong mat of continuous glass fibers, bonded together with a resinous binder to provide maximum strength. Joint tape shall be FM approved. Tape specifically designed to reinforce roofing membrane at insulation joint.

2.4 ASPHALT PRIMER

Asphalt-primer shall be asbestos free, quick-drying water based, polymer modified asphalt emulsion. Primer shall conform to ASTM D 41. Asphalt shall conform to ASTM D 312, Type III.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Roof insulation shall be installed in accordance with approved manufacturer's descriptive data and installation instructions.

Contractor shall examine deck surfaces for inadequate anchorage, foreign material, moisture, and unevenness, any condition which would prevent the execution and quality of application of roof insulation system as specified.

The Contractor shall not proceed with insulation application until existing roof deck defects as corrected.

Starting work designates acceptance of the surfaces by the Contractor.

Insulation material shall be cut and fit as necessary to fully insulate small areas and to accommodate piping, scuttles, skylights, vents, and other construction penetrating the insulation material.

3.2 PREPARATION

3.2.1 Protection of Property

Before starting work, paving and faces of building walls, adjacent to hoist areas, shall be protected. Protection shall be maintained for the duration of work.

HVAC units on the roofs shall be protected from damage. Coordinate with COR the use of HVAC units, during the installation of roofing materials, to avoid intake of unacceptable fumes.

3.2.2 Preparation of Surfaces

Surfaces on which thermal insulation materials are to be applied shall be clean, smooth, dry, and free from projections. Condition of surfaces shall be inspected and approved by the Contracting Officer prior to the start of roof insulation work.

Wood Decks

Apply rosin sheathing to wood roof decks with staples.

Concrete Decks

Seal joints between existing concrete roof planks with insulation joint tape prior to application of primer to deck.

Pre-drill holes into deck for concrete drive fasteners.

Metal Deck

Clean metal flutes of all dirt, dust, oil and grease.

3.3 APPLICATION

3.3.1 General Procedures

Insulation installation shall be continuous, with all operations proceeding together.

Before cessation of work on each working day or when work is interrupted due to rainfall or other causes, the roof shall be sealed against intrusion of water. Insulation or underlayment shall not be left exposed during rainfall or overnight.

Traffic over partially or completely finished underlayment or insulation shall be only on planks, or on plywood not less than 16 millimeter thick and 600 millimeter wide.

Materials temporarily stored on the roof shall be distributed to stay within the live-load limits of the roof, which is 15 Kg per square meter. pascal Ample bases shall be provided under equipment to distribute the weight to conform to the live-load limits.

3.3.2 Insulation Application

Insulation shall be installed in accordance with the manufacturer's requirements and as specified below.

Install insulation according to the following table.

<u>Surface</u>	<u>Preparation</u>	<u>First Layer</u>	<u>Second Layer</u>
Wood decks	Rosen paper	Rigid Board	Fiber Board
Concrete	Pre-drill	Rigid Board	Fiber Board
Metal decks		Rigid Board	Fiber Board

Provide minimum of 25 millimeters thick insulation at all roof drain collars or as indicated on the contract drawings. Thickness shall include 12 millimeters of rigid insulation and 12 millimeters of fiber cover board.

If any drain cannot accept specified thickness of insulation, then hold back insulation 400 millimeters and add tapered insulation to drain.

Total nominal thickness shall be installed in 2 layers. No more insulation shall be installed at one time than can be protected from wetting or other damage by installation of roofing membranes on the same day or prior to rain or dew.

Layer to receive the roofing membrane shall be installed with longitudinal joints parallel to the short dimension of the roof. Joints shall be staggered in each layer. First layer and between layers shall be installed with solid-contact. Insulation shall be laid with edges in moderate contact, but not forced into place. End joints shall be staggered.

Joints of insulation board shall be taped.

Temporary water cutoffs shall be installed at the completion of each day's work and removed upon resumption of work.

Mechanically attach first layer of insulation to concrete and metal decks with concrete drive or screw type fasteners according to manufacturer's recommendations and instructions.

Pre-drill pilot hole in concrete substrate approximately 12 millimeters deeper than the required embedment. Install concrete fasteners using 6.5 kg hammer until fastener head is seated firmly against the plate. Do not overdrive the fastener to avoid damage to roof deck. Fastener shall penetrate concrete substrate a minimum of 30 millimeters. Provide an insulation plate with each fastener.

Screw fastener shall penetrate metal deck a minimum of 19 millimeters, and 25 millimeters in a wood deck. Do not over or under tighten the fastener. Provide an insulation plate with each fastener.

Attach flashing membranes to wood nailers at 200 millimeters on center, or as directed by the manufacturer's recommendations or instructions.

Install top layer of insulation to rigid insulation with ribbon coverage of insulation adhesive at the rate of 0.4 to 0.8 L/m². Immediately after placement, walk insulation boards into adhesive to achieve solid contacts.

Adhere tapered insulation system and crickets in pattern prescribed by approved shop drawings.

3.4 INSULATION SCHEDULE

<u>Building</u>	<u>Slope</u>	<u>Average R-Value</u>
4	10mm/m	12
7	10mm/m	12
8	10mm/m	12
11	10mm/m	12
12	10mm/m	12
24	10mm/m	12
34	10mm/m	12
35-1	10mm/m	12
53	10mm/m	12
54	10mm/m	12
95	10mm/m	12

-- End of Section --

SECTION 07511
BUILT-UP ASPHALT ROOFING COLD PROCESS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 532	(1988) Structural Insulating Formboard (Cellulosic Fiber)
ASTM D 1863	(1993) Mineral Aggregate Used on Built-Up Roofs
ASTM D 2277	(1987) Fiberboard Nail-Base Sheathing
ASTM D 4586	(1993) Standard Specification for Asphalt Roof Cement, Asbestos Free
ASTM D 517	(1992) Asphalt Plank

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-01 Data

Manufacturer's Catalog Data shall be submitted for the following items:

Base Sheet
Roofing Felts
Bituminous Plastic Cement
Cants
Aggregate Surfacing
Roof Walkways
Adhesives
Elastomeric Flashing Sheet

SD-13 Certificates

Signed certificate by roofing manufacturer certifying that roofing systems meet performance requirements.

Manufacturer's Roofing System Warranty shall be submitted for material and labor for a period of 10 years.

SD-14 Samples

Three pieces of base, ply sheet and flashing backer sheet 300 by 300 millimeters square.

Three pieces of flashing membrane 300 by 300 millimeter square.

Three pieces of roof walkway pad 300 by 300 millimeters square.

1.3 QUALITY ASSURANCE

The roofing system shall be composed of materials and products approved by the manufacturer which provides the ten year warranty.

Applicator of roofing system shall be certified and approved by the roofing system manufacturer.

Provide full-time field technical services representative for monitoring project work on a full-time basis, and available for final roof inspection.

Roofing system manufacturer shall provide field representative to make periodic site visits, report work quality and job progress.

The presence and activity of the manufacturer's representative shall not relieve the Contractor of contractual responsibilities or duties.

1.4 PERFORMANCE REQUIREMENTS

Provide installed roofing membrane and base flashing that remain watertight, do not permit the passage of water, that resists specified uplift pressures and thermally induced movement and exposure to weather without failure.

Provide roofing materials that are compatible with one another under conditions of service and application requirements, as demonstrated by the roofing manufacturer based on previous testing and field experience.

1.5 DELIVERY, STORAGE AND HANDLING

Deliver roofing material to project site in original containers with seals unbroken and labeled with manufacturer's name, product name and type, date of manufacture and direction for storage.

Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling and other sources. Store in a dry location. Comply with insulation manufacturer's written instruction for handling, storing and protecting during installation.

Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.6 PROJECT CONDITIONS

Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instruction and warranty requirements.

1.7 WARRANTY

Provide manufacturer's standard form, without monetary limitation, which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within the specified warrant period. Failure includes roof leaks.

Warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, substrate board, base sheets, walkway products and other components of roofing system.

Warranty shall be in force for a period of 10 years from the date of final completion.

PART 2 PRODUCTS

2.1 ROOF SYSTEM

The roof system described in this section is based on the salient features of a cold process asphalt built-up roof application. The system consists of multi layers of asbestos free, non-porous reinforced asphalt sheets or SBS modified membranes that are adhered with a single component asphalt adhesive that is specifically designed as a cold application adhesive. The asphalt adhesive shall also be used to attach the final gravel roof covering.

Manufacturers meeting the Government's minimum requirements for cold process roofing systems are listed below.

Tremco, Incorporated, Burmastic 200 Built-up Roofing System or equal.
Johns Manville, Specification 2CIG -C for SBS Modified Bitumen Roofing System or equal.
Firestone Building Products Company, SBS Cold Process Roofing System or equal.

2.2 BASE, INTERPLY OR CAP SHEET ROOFING MEMBRANE

Roofing felts for the main field roofing shall be non-porous, smooth surface, polyester/glass reinforced asphalt coating, with a fine mineral parting agent. Roofing felts that make up the Cold Process system may incorporate asphalt felts or SBS modified asphalt membranes. Asphalt roofing felts shall meet or exceed the requirements for ASTM D 4601, Type II roofing sheets. SBS modified asphalt membranes shall meet or exceed the requirements of ASTM D 6164-00, Type I, Grade S. Thickness of felts shall range from a minimum of 1.2 millimeter to a maximum of 4.0 millimeters.

Roofing membranes shall be compatible with manufacturer's specified cold process adhesive, and when combined shall produce a homogeneous water proof roof system.

Manufacturers meeting the Government's minimum requirements for roofing felts are listed below.

Tremco, Incorporated Burmastic Composite Ply or equal
Johns Manville Glasbase Plus and Dynaply or equal
Firestone Building Products Company SBS Smooth or equal

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Weight	1.5kg/m ² (31lb/100ft ²)	ASTM D 228
Breaking Strength	600N MD (1351bf/in) 575N XD (1301bf/in)	ASTM D 146
Pliability, 12.7 mm (1/2") radius bend	No failures	ASTM D 146
Mass of desaturated Polyester/glass mat Surfacing & stabilizer	107g/m ² (2.21lb/100ft ²)min 65% max	ASTM D 146 ASTM D 4601
Asphalt	485 g/m ² (10.01lb/100ft ²)	ASTM D 228
Puncture resistant	5340 N (1201bf)	ASTM D 154

2.3 BASE FLASHING

Base flashing felts for walls and equipment curb flashing shall be non-porous, smooth surface, polyester/glass reinforced asphalt coating, with a fine mineral parting agent. Flashing felts may be similar to main roofing membranes and may incorporate asphalt felts or SBS modified asphalt membranes. Asphalt roofing felts shall meet or exceed the requirements for ASTM D 4601, Type II roofing sheets. SBS modified asphalt membranes shall meet or exceed the requirements of ASTM D 6164-00, Type I, Grade S. Thickness of felts shall range from a minimum of 1.2 millimeter to a maximum of 4.0 millimeters.

Flashing membranes shall be compatible with manufacturer's specified cold process flashing adhesive, and when combined shall produce a homogeneous water proof roof system.

Manufacturers meeting the Government's minimum requirements for base flashing felts are listed below.

Tremco, Incorporated Burmastic Composite Ply or equal
 Johns Manville Glastite Flexible or equal
 Firestone Building Products Company SBS Smooth or equal

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Weight	1.5kg/m ² (31lb/100ft ²)	ASTM D 228
Breaking Strength	600N MD (1351bf/in) 575N XD (1301bf/in)	ASTM D 146
Pliability, 12.7 mm (1/2") radius bend	No failures	ASTM D 146
Mass of desaturated Polyester/glass mat Surfacing & stabilizer	107g/m ² (2.21lb/100ft ²)min 65% max	ASTM D 146 ASTM D 4601
Asphalt	485 g/m ² (10.01lb/100ft ²)	ASTM D 228
Puncture resistant	5340 N (1201bf)	ASTM D 154

2.4 FLASHING MEMBRANE

Cap flashing membrane shall be non-porous, smooth surface or granular, polyester/glass reinforced asphalt coating, with a fine mineral parting agent on one or both sides. Cap flashing membranes that make up the Cold Process system may incorporate asphalt felts or SBS modified asphalt membranes. Asphalt roofing felts shall meet or exceed the requirements for ASTM D 4601, Type II roofing sheets. SBS modified asphalt membranes shall

meet or exceed the requirements of ASTM D 6164-00, Type I, Grade S. Thickness of felts shall range from a minimum of 1.2 millimeter to a maximum of 4.0 millimeters.

Cap flashing membranes may be granular coated on exposed side, or a smooth surface that may be coated with the manufacturer's recommended coating system for UV protection.

Roofing membranes shall be compatible with manufacturer's specified cold process flashing adhesive, and when combined shall produce a homogeneous water proof roof system.

Manufacturers meeting the Government's minimum requirements for flashing felts are listed below.

Tremco, Incorporated Hypalon Elastomeric Sheeting or equal
Johns Manville Dynaflex or equal
Firestone Building Products Company SBS Flashing or equal

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Thickness	0.045 in. (1.1 mm)	ASTM D 751
Tensile Strength	100N MD (225lb)	ASTM D 751
Elongation @ fabric break	25%	ASTM D 751
Tear resistance	95lbf (423N)	ASTM D 751
Water absorption @ 122 deg F (50 deg C)	less than 5%	ASTM D 471
Dimensional stability @ 212 deg F (100 deg C)	1.0-1.25%	ASTM D 1204
Low temperature flexibility	-40 deg to -45 deg F (-40 deg C to -43 deg C)	ASTM D 2136
Ply adhesion	15lbf (66N)	ASTM D 413

2.5 MESH STRIPPING

Mesh stripping shall be a non-shrinking, non-rotting, vinyl coated, woven glass mesh used for stripping in roof membrane, flashing and for reinforcing roof curb corners. An acceptable product is Burmesh reinforcing mesh as manufactured by Tremco Incorporated, or an approved industry standard mesh product.

2.6 ROOFING MEMBRANE ADHESIVE

Roofing membrane adhesive shall be a one or two-part, asbestos-free interplay and surfacing adhesive to be used in a multi-ply cold process built-up roofing system. The adhesive shall be used as a direct substitute for Types III and IV asphalts used in hot asphalt specifications, possessing waterproofing properties and is compatible with both SBS modified bitumen products and with conventional asphaltic materials. Adhesive shall comply with ASTM D 3019, Type III testing requirements.

Manufacturers meeting the Government's minimum requirements for membrane adhesives are listed below.

Tremco, Incorporated Burmastic Adhesive or equal
Johns Manville MBR Cold Application Adhesive or equal
Firestone Building Products Company MB Cold Adhesive or equal

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Asbestos content	None	EPA 600/R-93/116
Viscosity @ 25 deg C	25-75 Pa (25000-75000cP)	ASTM D 2196
Density @ 25 deg C	1.0kg/L (8.4lb/gal)	ASTM D 6511
Nonvolatile matter	67%	ASTM D 6511
Asphalt content, min	42%	ASTM D 6511
Flash point	less than 37 deg C (100 deg F)	ASTM D 93
Uniformity & consistency	Pass	ASTM D 6511
VOC temperature flexibility	300 g/L	ASTM D 6511

2.7 FLASHING ADHESIVE

Flashing adhesive shall be a one or two-part, asbestos-free interplay and surfacing adhesive to be used in a multi-ply cold process built-up roofing system. The adhesive shall be used as a direct substitute for Types III and IV asphalts used in hot asphalt specifications, possessing waterproofing properties and is compatible with both SBS modified bitumen products and with conventional asphaltic materials.

Manufacturers meeting the Government's minimum requirements for flashing adhesives are listed below.

Tremco, Incorporated Sheeting Bond Adhesive or equal
 Johns Manville MBR Utility Cement or equal
 Firestone Building Products Company MB Flashing Cement or equal

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Asbestos content	None	ASTM D 276
Viscosity @ 25 deg C	400-176 Pa (400,000-1,760,000cP)	ASTM D 2196
Density @ 25 deg C	1042 kg/m ³ (8.4lb/gal)	ASTM D 6511
Nonvolatile matter	67%	ASTM D 6511
Asphalt content, min	42%	ASTM D 6511
Flash point	less than 37 deg C (100 deg F)	ASTM D 93
Uniformity & consistency	Pass	ASTM D 6511
VOC temperature flexibility	340 g/L	ASTM D 6511

2.8 FLASHING LAP MASTIC

Flashing lap mastic shall be a one-part elastomer adhesive specifically formulated to bond lap joints in Hypalon elastomeric flashing. An acceptable product is Poly roof LV adhesive as manufactured by Tremco Incorporated. The salient features of Poly roof LV adhesive are as follows:

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Asbestos content	None	EPA 600/R-93/116
Viscosity @ 25 deg C	600-2000 Pa (600,000-2,000,000cP)	ASTM D 2196
Density @ 25 deg C	970 kg/m ³ (8.1lb/gal)	ASTM D 1475
Nonvolatile matter	70%	ASTM D 4586
Behavior at 140 deg F (Sag resistant)	6mm (1/4 in)	ASTM D 4586
Moisture vapor	1.55-6.2 g/m ² /24 hrs	ASTM E 398
Transmission rate	@ 0.51 mm (0.42g/100in ² /24 hrs)	
VOC	340 g/L	ASTM D 9360

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
-----------------	----------------------	--------------------

2.9 MASTIC

Mastic shall be an asphalt-based, heavily fibrated mastic, with penetrating oils and plasticizing agents, used to seal wall and curb flashing edges. An acceptable product is ELS mastic as manufactured by Tremco Incorporated.

The salient features of the ELS mastic are as follows:

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Asbestos content	None	ASTM 276
Viscosity @ 25 deg C	600-2000 Pa (600,000-2,000,000cP)	ASTM D 2196
Density @ 25 deg C	979 kg/m ³ (8.11lb/gal)	ASTM D 1475
Nonvolatile matter	70%	ASTM D 4586
Behavior at 140 deg F (Sag resistant)	3.18mm (1/8 in)	ASTM D 4586
Moisture vapor	1.55-6.2 g/m ² /24 hrs	ASTM E 398
Transmission rate	@ 0.51 mm (.42g/100in ² /24 hrs)	

2.10 ROOF ELASTOMER

Roof elastomer shall be a single-component roof elastomer mastic, with polymers and plasticizing agents, used to seal vertical wall and curb flashing edges. An acceptable product is Polyroof LV roof elastomer mastic as manufactured by Tremco Incorporated. The salient features of Polyroof LV mastic are as follows:

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Asbestos content	None	EPA 600/R-93/116
Viscosity @ 25 deg C	480-1000 Pa (480,000-1,000,000cP)	ASTM D 2196
Density @ 25 deg C	1114 kg/m ³ (9.31lb/gal)	ASTM D 1475
Nonvolatile matter	80%	ASTM D 4586
Behavior at 140 deg F (Sag resistant)	6mm (1/4 in)	ASTM D 4586
Moisture vapor	1.55-6.2 g/m ² /24 hrs	ASTM E 398
Transmission rate	@ 0.51 mm (0.40g/100in ² /24 hrs)	

2.11 REFLECTIVE COATING

Reflective coating shall be a high solids, water-based, elastomeric coating formulated with acrylic latex polymer, used for the coating of wall and curb flashing for UV protection. An acceptable product is High Build Reflective Coating as manufactured by Tremco Incorporated. The salient features of the High Building Reflective Coating are as follows:

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Asbestos content	None	EPA 600/R-93/116
Density @ 25 deg C	0.815 kg/L (6.81lb/gal)	ASTM D 1475
Viscosity @ 25 deg C	11.8 Pa (11,000cP)	ASTM D 2196
Nonvolatile matter	62% (by weight)	ASTM D 1644
Percent solids	70%	ASTM D 5201

2.12 CANTS

Cants shall be made from treated fiberboard and shall reduce the angle covered into two equal angles. Fiberboard shall conform to ASTM C 532 and ASTM D 2277, treated for moisture resistance by an integral treatment of wax or bituminous impregnation.

2.13 AGGREGATE SURFACING

Gravel shall conform to ASTM D 1863, size No. 7.

2.14 ROOF WALKWAYS

Asphalt planks shall be 950 by 1830 millimeter by 15 millimeter thick, consisting of a homogeneous core of asphalt, plasticizers, and fillers bonded between two saturated and coated facing sheets. Top side shall be surfaced with ceramic granules. Planks shall conform to ASTM D 517, mineral-surfaced asphalt.

PART 3 EXECUTION

3.1 ROOFING SYSTEM

Contractor shall provide a cold-applied roofing system with asphalt adhesive and aggregate surfacing over existing concrete, metal or wood deck with insulation.

The cold process roofing system shall be installed according to the manufacturer's recommendations and instructions. Roofing installation shall be continuous, with all operations proceeding together. Phasing of roofing system installation may be permitted due inclement weather or as approved by the Government.

Roofing shall be applied only when the ambient temperature is above 10 degrees C. Adhesive and roofing materials shall be kept in a heated enclosed space at least 24 hours prior to installation when temperatures are below 10 degrees C.

3.2 PREPARATION

Contractor shall verify that work of other trades that penetrates the roof deck or requires men and equipment to traverse the roof deck is complete.

Contractor shall examine deck surfaces for inadequate anchorage, foreign material, moisture, and unevenness which would prevent the execution and quality of application.

Contractor shall proceed with the roofing application only after defects have been corrected.

Starting work designates acceptance of the surfaces by the Contractor.

3.3 APPLICATION

3.3.1 General

Roofing installation shall be continuous, with all operations proceeding together. Specified plies of felt shall follow shingle-fashion as a single composite operation.

Interval between the base sheet application and succeeding plies shall not exceed 48 hours.

Before cessation of work on each working day or when work is interrupted due to rainfall or other causes, the roof shall be sealed against intrusion of water. Base sheet shall be brought to the edge of the insulation, dams shall be installed and exposed felts shall be effectively glazed. Insulation or unglazed felts shall not be left exposed during rainfall or overnight.

Debris shall be removed from the roof at the end of each work day.

3.3.2 Cold Process Built-Up Roofing Application

3.3.2.1 Roof Membrane

Install two (2) or three (3) plies of roofing felts in cold-process adhesive, shingle fashion as required by manufacturer's installation instructions. Interply application rate shall be at 1.2 L/m². Overlap starter strips 600 millimeters with first ply. Overlap each succeeding ply 630 millimeters. Place ply sheet to ensure water will flow over or parallel to, but never against exposed edges. Use 305,610 and 915 millimeters wide plies to start and finish roof membrane along roof edges and terminations or as required by manufacturer. Broom and/or roll ply sheet immediately after installation. Overlap previous day's work 610 millimeters. Lap ply membrane ends 150 millimeters. Stagger end laps 305 millimeters minimum.

Spray or brush apply cold-process adhesive at the rate of 2 L/m² over the entire roof surface as practical. Immediately broadcast minimum of 19.5 kg/m² of new, clean roofing gravel, conforming to ASTM D 1863. Cover flood coat material completely with gravel.

3.3.3 Flashing Applications

3.3.3.1 Edge Flashing

Secure continuous cleat to outside roof edge. Fabricate and install new stainless steel metal edge as shown on drawings. Stripe in edge with base flashing ply and heavily fibrated mastic as base flashing. Cover with flashing sheet and flashing adhesive. Over lap flashing 100 millimeters and secure edges with flashing lap mastic. Extend flashing 100 millimeters beyond base flashing.

3.3.3.2 Wall and Roof Curb Flashing

Adhere one ply of base flashing ply in a continuous application of heavily fibrated mastic. Extend base flashing ply 100 millimeters beyond toe of cant.

Cut flashing in lengths not to exceed ten feet in length. Apply flashing adhesive to base flashing ply in a continuous 1.6 millimeter thick application. Adhere flashing sheet to mastic. Lap flashing sheet ends 100 millimeters. Extend membrane 150 millimeters beyond toe of cant. Adhere laps with flashing lap mastic. Seal vertical and horizontal laps of flashing membrane with reinforcing mesh embedded between alternate continuous courses of elastomer sealant and heavily fibrated mastic. Mechanically attach flashing along top edge 8 inches on center.

Double coat all flashing materials with a reflective coating.

3.3.3.3 Expansion Joints

Construct a wood roof expansion joint assembly, complete with fiber cants, flashing and stainless steel cover.

3.3.3.4 Drains

Apply flashing ply sheet and lead sheet around roof drains, over newly installed plies in accordance with NRCA published flashing details. Cover flashing with two ply of roofing felts and strip-in edges with mesh and mastic. Provide new metal strainers for all drains that are missing a strainer.

3.3.4 Cant Strip Application

Cant strips shall be installed in the angles formed at wall and other vertical surfaces as backing for base flashings. Cant strips shall be laid in a solid coat of insulation adhesive just prior to laying the roofing plies. Cants shall have a 140 millimeter face dimension, shall be continuous, and shall be installed in as long lengths as practical.

3.3.5 Walkway Application

Asphalt plank walkway systems for the protection of the roofing membrane shall be installed.

A heavy coating of member adhesive shall be applied over the designated walkway areas and directly on the felt membrane. A 200 millimeter space shall be allowed between adjacent boards for drainage.

3.3.6 Vent Stack Flashing

Install new lead sheet flashing around existing vent stacks that penetrate the roof deck. Install lead flashing according to NRCA published flashing details.

-- End of Section --

SECTION 07512
BUILT-UP ASPHALT ROOFING HOT PROCESS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 532	(1988) Structural Insulating Formboard (Cellulosic Fiber)
ASTM D 1863	(1993) Mineral Aggregate Used on Built-Up Roofs
ASTM D 2178	(1989) Asphalt Glass (Felt) Used in Roofing and Waterproofing
ASTM D 2277	(1987) Fiberboard Nail-Base Sheathing
ASTM D 4586	(1993) Standard Specification for Asphalt Roof Cement, Asbestos Free
ASTM D 517	(1992) Asphalt Plank

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-01 Data

Manufacturer's Catalog Data shall be submitted for the following items:

Roofing Felts
Bituminous Plastic Cement
Cants
Aggregate Surfacing
Roof Walkways
Adhesives
Flashing Sheet

SD-13 Certificates

Signed certificate by roofing manufacturer certifying that roofing systems meet performance requirements.

Manufacturer's Roofing System Warranty shall be submitted for material and labor for a period of 10 years.

SD-14 Samples

Three pieces of base, ply sheet and flashing backer sheet 300 by 300 millimeters square.

Three pieces of flashing membrane 300 by 300 millimeter square.

Three pieces of roof walkway pad 300 by 300 millimeters square.

1.3 QUALITY ASSURANCE

The roofing system shall be composed of materials and products approved by the manufacturer which provides the ten year warranty.

Applicator of roofing system shall be certified and approved by the roofing system manufacturer.

Provide full-time field technical services representative for monitoring project work on a full-time basis, and available for final roof inspection.

Roofing system manufacturer shall provide field representative to make periodic site visits, report work quality and job progress.

The presence and activity of the manufacturer's representative shall not relieve the Contractor of contractual responsibilities or duties.

1.4 PERFORMANCE REQUIREMENTS

Provide installed roofing membrane and base flashing that remain watertight, do not permit the passage of water, that resists specified uplift pressures and thermally induced movement and exposure to weather without failure.

Provide roofing materials that are compatible with one another under conditions of service and application requirements, as demonstrated by the roofing manufacturer based on previous testing and field experience.

1.5 DELIVERY, STORAGE AND HANDLING

Deliver roofing material to project site in original containers with seals unbroken and labeled with manufacturer's name, product name and type, date of manufacture and direction for storage.

Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling and other sources. Store in a dry location. Comply with insulation manufacturer's written instruction for handling, storing and protecting during installation.

Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.6 PROJECT CONDITIONS

Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instruction and warranty requirements.

1.7 WARRANTY

Provide manufacturer's standard form, without monetary limitation, which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within the specified warrant period. Failure includes roof leaks.

Warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, substrate board, base sheets, walkway products and other components of roofing system.

Warranty shall be in force for a period of 10 years from the date of final completion.

PART 2 PRODUCTS

2.1 ROOF SYSTEM

The roof system described in this section is based on the salient features of a hot process asphalt built-up roof application. The system consists of multi layers of asbestos free, porous fiberglass asphalt sheets or SBS modified membranes that are adhered with hot asphalt that is specifically designed in a built-up application. The asphalt hot shall also be used to attach the final gravel roof covering.

Manufacturers meeting the Government's minimum requirements for hot process roofing systems are listed below.

Tremco, Incorporated, Therm 100, 4-ply Built-up Roofing System or equal

Johns Manville, Specification 4CIG Built-up Roofing System or equal
Firestone Building Products Company, Hot Process 4-ply Roofing System or equal

Soprema, Incorporated, Flood Coat and Gravel System or equal

2.2 BASE, INTERPLY OR CAP SHEET ROOFING MEMBRANE

Roofing felts for the main field roofing shall be porous, smooth surface, fiberglass reinforced asphalt coating, with a fine mineral parting agent. Roofing felts that make up the Hot Process system may incorporate asphalt felts or SBS modified asphalt membranes. Asphalt roofing felts shall meet or exceed the requirements for ASTM D 2178, Type IV roofing sheets. SBS modified asphalt membranes shall meet or exceed the requirements of ASTM D 6164-00, Type I, Grade S. Thickness of felts shall range from a minimum of 1.0 millimeter to a maximum of 2.2 millimeters.

Roofing membranes shall be compatible with manufacturer's specified hot process adhesive, and when combined shall produce a homogeneous water proof roof system.

Manufacturers meeting the Government's minimum requirements for roofing felts are listed below.

Tremco, Incorporated Composite Ply Base and Thermglass Plus or equal

Johns Manville Glasply IV or equal

Firestone Building Products Company Ply IV or equal

Suprema, Incorporated Elastophene 180 or equal

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Weight, roll	1.8kg	ASTM D 2178
Breaking Strength	7.7 kN/m	
Pliability, 13mm radius	No failures	
Mass of desaturated glass Mat, minimum	83.0 g/m ²	
Surfacing & stabilizer	156 g/m ²	
Asphalt, minimum	146.0 g/m ²	
Width of roll	1000 millimeter	

2.3 BASE FLASHING

Base flashing felts for walls and equipment curb flashing shall be non-porous, smooth surface, polyester/glass reinforced asphalt coating, with a fine mineral parting agent. Flashing felts may be similar to main roofing membranes and may incorporate asphalt felts or SBS modified asphalt membranes. Asphalt roofing felts shall meet or exceed the requirements for ASTM D 4601, Type II roofing sheets. SBS modified asphalt membranes shall meet or exceed the requirements of ASTM D 6164-00, Type I, Grade S. Thickness of felts shall range from a minimum of 1.2 millimeter to a maximum of 4.0 millimeters.

Flashing membranes shall be compatible with manufacturer's specified hot process flashing adhesive, and when combined shall produce a homogeneous water proof roof system.

Manufacturers meeting the Government's minimum requirements for base flashing felts are listed below.

Tremco, Incorporated Burmastic Composite Flashing or equal
 Johns Manville Glastite Flexible or equal
 Firestone Building Products Company SBS Smooth or equal
 Soprema, Incorporated, Elastophene 180 PS or equal

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Weight	1.5kg/m ² (31lb/100ft ²)	ASTM D 228
Breaking Strength	600N MD (1351bf/in) 575N XD (1301bf/in)	ASTM D 146
Pliability, 12.7 mm (1/2") radius bend	No failures	ASTM D 146
Mass of desaturated Polyester/glass mat	107g/m ² (2.21lb/100ft ²)min	ASTM D 146
Surfacing & stabilizer	65% max	ASTM D 4601
Asphalt	485 g/m ² (10.01lb/100ft ²)	ASTM D 228
Puncture resistant	5340 N (1201bf)	ASTM D 154

2.4 FLASHING MEMBRANE

Cap flashing membrane shall be non-porous, smooth surface or granular, polyester/glass reinforced asphalt coating, with a fine mineral parting agent on one or both sides. Cap flashing membranes that make up the Cold Process system may incorporate asphalt felts or SBS modified asphalt membranes. Asphalt roofing felts shall meet or exceed the requirements for ASTM D 4601, Type II roofing sheets. SBS modified asphalt membranes shall meet or exceed the requirements of ASTM D 6164-00, Type I, Grade S.

Thickness of felts shall range from a minimum of 1.2 millimeter to a maximum of 4.0 millimeters.

Cap flashing membranes may be granular coated on exposed side, or a smooth surface that may be coated with the manufacturer's recommended coating system for UV protection.

Roofing membranes shall be compatible with manufacturer's specified cold process flashing adhesive, and when combined shall produce a homogeneous water proof roof system.

Manufacturers meeting the Government's minimum requirements for flashing felts are listed below.

Tremco, Incorporated Hypalon Elastomeric Sheeting or equal
 Johns Manville Dynaflex or equal
 Firestone Building Products Company, SBS Flashing or equal
 Soprema, Incorporated, Sopralene Flam 180 GR or equal

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Thickness	0.045 in. (1.1 mm)	ASTM D 751
Tensile Strength	100N MD (2251b)	ASTM D 751
Elongation @ fabric break	25%	ASTM D 751
Tear resistance	951bf (423N)	ASTM D 751
Water absorption @ 122 deg F (50 deg C)	less than 5%	ASTM D 471
Dimensional stability @ 212 deg F (100 deg C)	1.0-1.25%	ASTM D 1204
Low temperature flexibility	-40 deg to -45 deg F (-40 deg C to -43 deg C)	ASTM D 2136
Ply adhesion	151bf (66N)	ASTM D 413

2.5 MESH STRIPPING

Mesh stripping shall be a non-shrinking, non-rotting, vinyl coated, woven glass mesh used for stripping in roof membrane, flashing and for reinforcing roof curb corners. An acceptable product is Burmesh reinforcing mesh as manufactured by Tremco Incorporated, or an approved industry standard mesh product.

2.6 ROOFING MEMBRANE ADHESIVE

Roofing membrane adhesive shall be hot mopped asphalt roofing system. The adhesive shall be Types III and IV asphalts used in hot asphalt specifications, possessing waterproofing properties and is compatible with both SBS modified bitumen products and with conventional asphaltic materials. Asphalt shall comply with ASTM D 312 testing requirements.

Manufacturers meeting the Government's minimum requirements for membrane adhesives are listed below.

Tremco, Incorporated Premium III or IV asphalt or equal
 Johns Manville Type III or IV asphalt or equal
 Firestone Building Products Company Type III or IV asphalt or equal
 Soprema, Incorporated Type III or IV asphalt or equal

COLD PROCESS ADHESIVE

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Asbestos content	None	EPA 600/R-93/116
Viscosity @ 25 deg C	25-75 Pa (25000-75000cP)	ASTM D 2196
Density @ 25 deg C	1.0kg/L (8.4lb/gal)	ASTM D 6511
Nonvolatile matter	67%	ASTM D 6511
Asphalt content, min	42%	ASTM D 6511
Flash point	less than 37 deg C (100 deg F)	ASTM D 93
Uniformity & consistency	Pass	ASTM D 6511
VOC temperature flexibility	300 g/L	ASTM D 6511

2.7 FLASHING ADHESIVE

Flashing adhesive shall be hot asphalt, heat welding of specially treated asphalt sheets and one or two-part, asbestos-free interplay and surfacing adhesive to be used in a multi-ply cold process built-up roofing system. Hot asphalt, heat welding and cold applied adhesive shall be compatible with both SBS modified bitumen products, elastomeric sheets and with conventional asphaltic materials.

Manufacturers meeting the Government's minimum requirements for flashing adhesives are listed below.

Tremco, Incorporated Sheeting Bond Adhesive or equal
 Johns Manville asphalt, MBR Flashing or MBR Utility Cement or equal
 Firestone Building Products Company asphalt or MB Flashing Cement or equal
 Soprema, Incorporated heat welding of specially treated cap sheets or equal

COLD PROCESS ADHESIVE

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Asbestos content	None	ASTM D 276
Viscosity @ 25 deg C	400-176 Pa (400,000-1,760,000cP)	ASTM D 2196
Density @ 25 deg C	1042 kg/m ³ (8.4lb/gal)	ASTM D 6511
Nonvolatile matter	67%	ASTM D 6511
Asphalt content, min	42%	ASTM D 6511
Flash point	less than 37 deg C (100 deg F)	ASTM D 93
Uniformity & consistency	Pass	ASTM D 6511
VOC temperature flexibility	340 g/L	ASTM D 6511

2.8 MASTIC

Mastic shall be an asphalt-based, heavily fibrated mastic, with penetrating oils and plasticizing agents, used to seal wall and curb flashing edges.

An acceptable product is ELS mastic as manufactured by Tremco Incorporated.

The salient features of the ELS mastic are as follows:

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Asbestos content	None	ASTM 276
Viscosity @ 25 deg C	600-2000 Pa (600,000-2,000,000cP)	ASTM D 2196
Density @ 25 deg C	979 kg/m ³ (8.1lb/gal)	ASTM D 1475
Nonvolatile matter	70%	ASTM D 4586
Behavior at 140 deg F (Sag resistant)	3.18mm (1/8 in)	ASTM D 4586

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Moisture vapor	1.55-6.2 g/m ² /24 hrs	ASTM E 398
Transmission rate	@ 0.51 mm (.42g/100in ² /24 hrs)	

2.9 REFLECTIVE COATING

Reflective coating shall be a high solids, water-based, elastomeric coating formulated with acrylic latex polymer, used for the coating of wall and curb flashing for UV protection. An acceptable product is High Build Reflective Coating as manufactured by Tremco Incorporated. The salient features of the High Building Reflective Coating are as follows:

<u>Property</u>	<u>Typical Value</u>	<u>Test Method</u>
Asbestos content	None	EPA 600/R-93/116
Density @ 25 deg C	0.815 kg/L (6.8lb/gal)	ASTM D 1475
Viscosity @ 25 deg C	11.8 Pa (11,000cP)	ASTM D 2196
Nonvolatile matter	62% (by weight)	ASTM D 1644
Percent solids	70%	ASTM D 5201

2.10 CANTS

Cants shall be made from treated fiberboard and shall reduce the angle covered into two equal angles. Fiberboard shall conform to ASTM C 532 and ASTM D 2277, treated for moisture resistance by an integral treatment of wax or bituminous impregnation.

2.11 AGGREGATE SURFACING

Gravel shall conform to ASTM D 1863, size No. 7.

2.12 ROOF WALKWAYS

Asphalt planks shall be 950 by 1830 millimeter by 15 millimeter thick, consisting of a homogeneous core of asphalt, plasticizers, and fillers bonded between two saturated and coated facing sheets. Top side shall be surfaced with ceramic granules. Planks shall conform to ASTM D 517, mineral-surfaced asphalt.

PART 3 EXECUTION

3.1 ROOFING SYSTEM

Contractor shall provide a hot-applied roofing system with asphalt adhesive and aggregate surfacing over existing concrete, metal or wood deck with insulation.

The hot process roofing system shall be installed according to the manufacturer's recommendations and instructions. Roofing installation shall be continuous, with all operations proceeding together. Phasing of roofing system installation may be permitted due inclement weather or as approved by the Government.

Roofing shall be applied only when the ambient temperature is above 10 degrees C. Adhesive and roofing materials shall be kept in a heated enclosed space at least 24 hours prior to installation when temperatures are below 10 degrees C. Avoid overheating asphalt. Insulated asphalt lines and insulated roof-top equipment shall be used.

3.2 PREPARATION

Contractor shall verify that work of other trades that penetrates the roof deck or requires men and equipment to traverse the roof deck is complete.

Contractor shall examine deck surfaces for inadequate anchorage, foreign material, moisture, and unevenness which would prevent the execution and quality of application.

Contractor shall proceed with the roofing application only after defects have been corrected.

Starting work designates acceptance of the surfaces by the Contractor.

3.3 APPLICATION

3.3.1 General

Roofing installation shall be continuous, with all operations proceeding together. Specified plies of felt shall follow shingle-fashion as a single composite operation.

Interval between the base sheet application and succeeding plies shall not exceed 48 hours.

Before cessation of work on each working day or when work is interrupted due to rainfall or other causes, the roof shall be sealed against intrusion of water. Base sheet shall be brought to the edge of the insulation, dams shall be installed and exposed felts shall be effectively glazed. Insulation or unglazed felts shall not be left exposed during rainfall or overnight.

Debris shall be removed from the roof at the end of each work day.

3.3.2 Hot Process Built-Up Roofing Application

3.3.2.1 Roof Membrane

Install one base sheet and three (3) plies or four (4) plies of roofing felts in hot-process adhesive, shingle fashion as required by manufacturer's installation instructions. Interply application rate shall be at 1.2 Kg/m². Overlap starter strips 600 millimeters with first ply. Overlap each succeeding ply 630 millimeters. Place ply sheet to ensure water will flow over or parallel to, but never against exposed edges. Use 305,610 and 915 millimeters wide plies to start and finish roof membrane along roof edges and terminations or as required by manufacturer. Broom and/or roll ply sheet immediately after installation. Overlap previous day's work 610 millimeters. Lap ply membrane ends 150 millimeters. Stagger end laps 305 millimeters minimum.

Brush apply hot-process asphalt adhesive at the rate of 2 Kg/m² over the entire roof surface as practical. Immediately broadcast minimum of 19.5 kg/m² of new, clean roofing gravel, conforming to ASTM D 1863. Cover flood coat material completely with gravel.

3.3.3 Flashing Applications

3.3.3.1 Edge Flashing

Secure continuous cleat to outside roof edge. Fabricate and install new stainless steel metal edge as shown on drawings. Stripe in edge with base flashing ply and heavily fibrated mastic as base flashing. Cover with flashing sheet and flashing adhesive. Over lap flashing 100 millimeters and secure edges with flashing lap mastic. Extend flashing 100 millimeters beyond base flashing.

3.3.3.2 Wall and Roof Curb Flashing

Adhere one ply of base flashing ply in a continuous application of heavily fibrated mastic or asphalt. Extend base flashing ply 100 millimeters beyond toe of cant.

Cut flashing in lengths not to exceed ten feet in length. Apply asphalt or flashing adhesive to base flashing ply in a continuous 1.6 millimeter thick application. Adhere flashing sheet to asphalt or mastic. Lap flashing sheet ends 100 millimeters. Extend membrane 150 millimeters beyond toe of cant. Adhere laps with flashing lap mastic or asphalt. Seal vertical and horizontal laps of flashing membrane with reinforcing mesh embedded between alternate continuous courses of elastomer sealant, heavily fibrated mastic or asphalt. Mechanically attach flashing along top edge 8 inches on center.

Double coat all flashing materials with a reflective coating if non-granular cap sheet is not used.

3.3.3.3 Expansion Joints

Construct a wood roof expansion joint assembly, complete with fiber cants, flashing and stainless steel cover.

3.3.3.4 Drains

Apply flashing ply sheet and lead sheet around roof drains over newly installed plies in accordance with NRCA published flashing details. Cover flashing with two ply of roofing felts and strip-in edges with mesh and mastic. Provide new metal strainers for all drains that are missing a strainer.

3.3.4 Cant Strip Application

Cant strips shall be installed in the angles formed at wall and other vertical surfaces as backing for base flashings. Cant strips shall be laid in a solid coat of insulation adhesive just prior to laying the roofing plies. Cants shall have a 140 millimeter face dimension, shall be continuous, and shall be installed in as long lengths as practical.

3.3.5 Walkway Application

Asphalt plank walkway systems for the protection of the roofing membrane shall be installed.

A heavy coating of member adhesive shall be applied over the designated walkway areas and directly on the felt membrane. A 200 millimeter space shall be allowed between adjacent boards for drainage.

3.3.6 Vent Stack Flashing

Install new lead sheet flashing around existing vent stacks that penetrate the roof deck. Install lead flashing according to NRCA published flashing details.

-- End of Section --

SECTION 07600

FLASHING AND SHEETMETAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 167	(1994; Rev A) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM B 224	(1992) Standard Classification of Coppers
ASTM B 32	(1995) Specification for Solder Metal
ASTM B 370	(1992) Standard Specifications for Copper Sheet and Strip for Building Construction
ASTM C 920	(1995) Standard Specification for Elastomeric Joint Sealants
ASTM D 4586	(1993) Standard Specification for Asphalt Roof Cement, Asbestos Free

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(1994) Structural Welding Code - Steel
----------	--

SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION (SMACNA)

SMACNA-02A	(1980; 5th Ed) Architectural Sheet Metal Specifications
------------	---

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-04 Drawings

Fabrication Drawings for the following items shall include material, description, and thickness.

Flashing
Sheet Metal
Accessories

PART 2 PRODUCTS

2.1 SHEETMETAL MATERIALS

2.1.1 Corrosion-Resistant Steel

Corrosion-resistant steel shall be chromium-nickel steel conforming to ASTM A 167, Type 301, 302, 204, or 316, No. 2D finish, annealed temper as required for the end use.

2.1.2 Copper

Copper shall be standard electrolytic tough-pitch copper, Type ETP fire-refined tough-pitch copper, Type FRTP as classified in ASTM B 224 and conforming to ASTM B 370, light cold-rolled temper.

2.1.3 Minimum Dimensions and Thicknesses

Materials shall be in accordance with SMACNA-02A and shall be not less than the following minimum thicknesses and weights.

<u>ITEM</u>	<u>CORROSION RESISTANT STEEL THICKNESS METER</u>	<u>COPPER, KG PER SQUARE METER</u>
Building expansion joints, cap	0.48	--
Bellows or flanges, U-type	0.48	--
Flashings		
Roof drain		6.1
Cap, roof penetration cap flashing, equipment and structural supports, pitch pans	0.48	6.1
Through-wall, above roof line, including coping and parapet	0.48	--
Cleats, 50 by 75 millimeter	0.55	--
Edge strips, 32 millimeter wide	0.70	--
Reglets	0.40	--
Cap flashing receivers	0.48	6.1
Gravel stop fascias:		
Corrugated sheets	0.48	--
Smooth sheets to 90 millimeters	0.48	--
Smooth sheets over 90 millimeters	0.55	--
Gutters and downspouts:		
Gutter sections, end caps	0.48	--
Continuous cleats, cover plates	0.48	--
Downspouts, conductor heads	0.40	--
Scupper linings	0.48	--
Strainer wire	2.77	--
diameter	dia.	
Downspout hangers, 50mm	1.3	--
Gutter hangers, 25 mm	1.3	--
Splash pans	0.48	--

2.2 CEMENTS AND SEALING COMPOUNDS

2.2.1 Bituminous Plastic Cement

Bituminous plastic cement shall be an asphaltic-base material conforming to

ASTM D 4586, compatible with the roofing asphalts and asphalt primer.

2.2.2 Sealing Compound

Sealing compound shall be gun grade, one-component, nonsag, elastomeric, conforming to ASTM C 920. Base material shall be polysulfide, resistant to 50-percent joint movement.

2.3 SOLDER MATERIALS

Solder and flux shall meet the requirements of ASTM B 32. Solder shall be SN50.

2.4 FASTENERS

Fasteners shall be the same metal or a metal compatible with the material joined.

PART 3 EXECUTION

3.1 GENERAL

Sheetmetal work shall conform to drawing details and to the applicable plate number and design and installation recommendations of SMACNA-02A. Finished sheetmetal installation shall be free from water leakage.

Surfaces to receive sheetmetal work shall be clean, smooth, dry, and free from defects and projections which might affect the work. Surfaces shall be plumb and true to a tolerance of not more than 13 millimeter in 12.2 meter, with no dips, waves, or uneven surfaces exceeding 3.2 millimeter in 3000 millimeter in any direction. Lines, arises, and angles shall be sharp and uniform. Exposed edges of sheetmetal shall be folded back to form a 13 millimeter wide hem on the concealed side.

3.1.1 Fastening Methods

Fasteners shall be concealed. Only one edge shall be nailed to permit freedom of expansion perpendicular to the line of nailing. Nails shall be spaced at not more than 75 millimeter on center. Nails shall penetrate backing by not less than 25 millimeter.

Cleats shall be used for securing edges of sheetmetal members over 300 millimeter wide and at other designated locations. Cleats shall be fastened with two nails and the end folded over the nails. Other end of the cleat shall be locked into the seam or the folded edge of member being fastened. Cleats shall be spaced at not more than 300 millimeter on center.

Screws shall be fitted with neoprene washers to protect surface of metal sheet and provide a watertight connection.

3.1.2 Seams

Seams and lock joint construction shall conform to SMACNA-02A.

Seams shall be straight and uniform in height, width, and finish as follows:

Flat-lock seams shall be not less than 19 millimeter wide.

Lap seams, when soldered, shall finish not less than 25 millimeter wide.

Lap seams, not soldered, shall overlap not less than 75 millimeter.

Joints, seams, and connections of copper shall be soldered except where other methods of joining are indicated.

Joints, seams, and connections of aluminum shall be welded except where a screw or riveted and hard-setting sealant connection is indicated.

Loose-lock expansion seams shall be not less than 75 millimeter wide and shall provide for not less than a 25 millimeter movement within the joint. Joint shall be completely filled with the specified sealant applied at not less than 3.2 millimeter bed thickness.

Flat seams shall be made in the direction of flow. Seams not soldered shall be completely filled with plastic cement.

Surfaces to be joined by soldering shall be cleaned, pretinned, heated, fluxed, and sweat-soldered through the full contact area in accordance with the best standards of practice in modern sheet metal shops. Flux residue and foreign matter shall be removed after soldering. Soldered surfaces shall be rinsed with water and wiped clean.

Procedures for manual shielded metal-arc welding, the appearance and quality of welds made, and the methods used in correcting welding work shall conform to AWS D1.1.

3.1.3 Provisions for Expansion and Contraction

Expansion-joint configuration shall conform to the drawing details and to SMACNA-02A, Figure 5.1.

3.1.4 Dissimilar Metals

Dissimilar metals shall be isolated from each other by painting with bituminous paint.

3.2 FLASHING

3.2.1 Reglets and Flashing Receivers

Reglets and flashing receivers shall conform to SMACNA-02A, Figure 4-4. Masonry joints or concrete shall be cut to form a saw-cut reglet. Slots shall be cut to a depth not less than 38 millimeter and approximately 0.19 millimeter thick.

3.2.2 Roof Flashing

Flashing shall extend not less than 60 millimeter beyond roof drain.

3.2.3 Cap and Counter Flashing

Metal cap or counter flashing shall be installed where horizontal roof surfaces abut vertical wall surfaces, at copings, at joints between existing and new construction, at penetrations of roof surfaces, and at equipment supports. Configuration shall conform to SMACNA-02A, Figure 3-4.

Flashing shall be formed in 3000 millimeter lengths, except where shorter pieces are required; end joints shall be lapped not less than 75 millimeter.

Joints shall not be soldered.

3.2.4 Edge Strips

Edge trim strips shall have a formed drip edge.

3.2.5 Flashing at Roof Penetrations and Equipment Supports

Metal flashing conforming to SMACNA-02A, Figure 4-16, shall be installed where piping, conduit, or equipment supports penetrate roof surfaces.

Single-pipe vents shall be flashed with stainless steel flashing or a two-piece formed-metal housing of the specified sheetmetal, installed as indicated in SMACNA-02A, Figure 4-19A.

3.3 GRAVEL-STOP FASCIAS

Gravel-stop fascias shall be installed at exposed edges of built-up roofs. Configuration shall conform to SMACNA-02A, Figure 2-1A. Lower edge of each gravel-stop fascia section shall be secured in place by hooking over a continuous edge strip or cleat. Flanges of each section shall extend out on the top of roofing felts not less than 90 millimeter.

A 7 millimeter open joint shall be provided between each gravel-stop fascia section, with a 300 millimeter wide plate centered on the joint. System shall be installed in accordance with SMACNA-02A, Figure 2-5C.

3.4 CLEANING

Exposed sheetmetal work shall be cleaned of all surface contaminants and imperfections at completion of installation.

-- End of Section --

SECTION 07920

SEALANTS AND CALKINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 920 (1995) Standard Specification for
Elastomeric Joint Sealants

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-01 Data

Manufacturer's Catalog Data shall be submitted for the following items:

Elastomeric Sealants

SD-14 Samples

The Contractor shall submit the following samples:

Three cured color bead samples of each color and type of Sealing Compound to be used in the work, approximately 6 millimeter wide by 25 millimeter long.

Three Labels for each sample container of sealants including the following information; supplier, name of material, formula or specification number, lot number, color, date of manufacture, mixing instructions, life expectancy of the application, curing time, and shelf life.

Three Backup Material samples of each material, grade, rod size, and tube size to be used in the work, full size by 300 millimeter long.

1.3 QUALITY ASSURANCE

1.3.1 Compatibility with Substrate

Sealants shall be verified for compatibility for use with joint substrates.

1.3.2 Joint Tolerance

Joint tolerances shall be in accordance with manufacturer's instructions.

1.4 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered in sealed containers that identify the product, manufacturer, color, directions for use, shelf life, and curing time at 40 degrees C.

Materials shall be kept dry and shall be protected from freezing.

1.5 SPECIAL WARRANTY

Sealant joint shall be guaranteed against failure of sealant and against water penetration through each sealed joint for five years.

PART 2 PRODUCTS

2.1 SEALANTS

2.1.1 Elastomeric

Elastomeric sealant shall be single component, color as selected, conforming to ASTM C 920, Type S, Grade NS, Class 25, use NT. Base material shall be urethane.

2.2 SOLVENTS AND CLEANING AGENTS

Solvents, cleaning agents, and accessory materials shall be provided as recommended by the manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

Unsound substrates shall be repaired. Joint dimensions and surfaces receiving substrates shall be verified that they comply with the manufacturer's recommendations.

3.2 PREPARATION

Prepare and prime joints in accordance with manufacturer's instructions. Adjacent exposed surfaces shall be protected.

3.3 INSTALLATION

Sealants shall be applied within recommended temperature and humidity conditions.

Sealants shall be installed free of air pockets, foreign embedded matter, ridges and sags.

Sealant shall be installed to cover the following conditions:

Flashin joints around curbs, supports, and at parapets and building flashints.

3.4 INSPECTION AND ACCEPTANCE PROVISIONS

All work shall be inspected for proper installation. Calking and sealing shall be rejected for the following deficiencies:

Calking compound having a finished surface not conforming to specifications.

Sealing compound with color not matching the sample or surface not complying with specifications.

Sealing compound failing to adhere to side surfaces of joints.

3.5 CLEANING AND REPAIRING

Surfaces adjoining joint excess and smears resulting from installation shall be cleaned.

Defective work shall be removed and replaced with calking and sealing materials as indicated.

3.6 PROTECTION

Installed sealants shall be protected until cured.

-- End of Section --

SECTION 09915

PAINTING

PART 1 GENERAL

1.1 REFERENCES (Not Applicable)

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-03 Product Data

Manufacturer's catalog data shall be submitted for paint materials as listed in the paragraph entitled, "General," of this section.

SD-04 Samples

Manufacturer's Standard Color Charts shall be submitted for paint materials in accordance with paragraph entitled, "General," of this section.

SD-07 Certificates

Certificates shall be submitted for paint materials in accordance with paragraph entitled, "General," of this section.

PART 2 PRODUCTS

2.1 GENERAL

The following Sherwin-Williams painting systems are acceptable products for this project.

1. Galvanized Primer

Brush, roll or spray one coat of METAL GALVITE HS, series B50WZ30, to existing galvanized surfaces, prior to applying final paint coating. Apply at the rate of 5 m² per liter (230 ft² per gallon) to obtain a DFT of 0.10 millimeters (3-4 mils).

2. Metal Primer

Brush, roll or spray on one coat of KEM BOND HS PRIMER series B50Z series, to bare metal (steel surfaces, prior to applying final paint coating. Apply at the rate of 4 to 12 m² per liter (205 to 513 ft² per gallon) to obtain a DFT of 0.12 millimeters (2-5 mils).

3. Aluminum Paint

Brush roll two coats of SILVER BRITER ALUMINUM PAINT, series B59S11, to previously painted surfaces that will experience temperatures below 200 degrees F. Apply at the rate of 12 to 20 m² per liter (438 to 658 ft² per gallon) to obtain a DFT of 0.040 millimeters (1 to 1.5 mils) each

coat. Total DT shall be 0.08 millimeters (2 to 3 mils). Color shall be silver. Reducer/clean-up material shall be MINERAL SPIRITS, R1K4.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Manufacturer's recommendations for surface preparation, thinning, mixing, handling, and applying his product shall be considered a part of this specification.

Surfaces shall be clean, dry, and free from contaminants and foreign matter. Mildew and chalking shall be removed and the surface thoroughly sterilized. Chipped, peeling, or blistered paint shall be removed and the surface spot-primed. Hard glossy surfaces shall be dulled and roughened to ensure proper adhesion.

3.1.1 Metal

Surfaces shall be dry and free from dirt, oil, grease, wax, and other contaminants. Oxide or corrosion shall be removed by hand, power tool, or blast cleaning.

3.2 MIXING AND APPLICATION

Exterior painting shall not be allowed in rainy weather or when rain is imminent. Paints or coatings shall not be applied when the temperature or humidity exceeds the manufacturer's recommendations.

Each coat of material applied shall be free from evidence of poor application. Variations in color, gloss, and texture shall not be acceptable.

Finish coats shall show good hiding characteristics and uniform appearance.

Newly painted surfaces shall be protected from damage.

There shall be at least 1 coat of prime paint and two coats finished paint applied in accordance with the manufacturer's instructions.

Each coat shall be applied uniformly at the wet-film thickness as specified by the manufacturer.

Spot-painting to correct damaged surfaces will be allowed only when touch-up area blends into the surrounding finish. Otherwise, the entire area shall be recoated. Touchup shall be accomplished using the same method of application as was used to apply the original material.

3.3 PROTECTION REQUIREMENTS

"WET PAINT" signs shall be posted to indicate newly painted surfaces.

3.4 PAINT SCHEDULE

EXTERIOR APPLICATION

1. Roof Curb Covers and Flashing

Paint existing surfaces at Details B-1, CC-1, CC-3, and CC-4 as shown

on the drawing CF-190970. PAinting is required on Buildings 4, 7, 8, 11, 24, 34, and 54.

3.5 Metal Roof and Gutters

Paint existing metal roof and gutters on Building 53 as indicated in Note No. 11, as shown on drawing CF-15733.

-- End of Section --

SECTION 13281

ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z9.2 (1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems

ANSI Z88.2 (1992) Respiratory Protection

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 732 (1995) Aging Effects of Artificial Weathering on Latex Sealants

ASTM D 522 (1993; Rev. A) Mandrel Bend Test of Attached Organic Coatings

ASTM D 1331 (1989; R 1995) Surface and Interfacial Tension of Solutions of Surface-Active Agents

ASTM D 2794 (1993) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

ASTM E 84 (1995; Rev. B) Surface Burning Characteristics of Building Materials

ASTM E 96 (1995) Water Vapor Transmission of Materials

ASTM E 119 (1995; Rev. A) Fire Tests of Building Construction and Materials

ASTM E 736 (1992) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

ASTM E 1368 (1990) Visual Inspection of Asbestos Abatement Projects

ASTM E 1494 (1992) Encapsulants for Spray- or Trowel-Applied Friable Asbestos-Containing Building Materials

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1926.103	Respiratory Protection
29 CFR 1926.51	Sanitation
29 CFR 1926.200	Accident Prevention Signs and Tags
29 CFR 1926.59	Hazard Communication
29 CFR 1926.1101	Asbestos, Tremolite, Anthophyllite, Actinolite
40 CFR 61-SUBPART A	General Provisions
40 CFR 61-SUBPART M	National Emission Standard for Asbestos
40 CFR 763	Asbestos Containing Material in Schools

UNDERWRITERS LABORATORIES INC. (UL)

UL 586	(1990) High-Efficiency, Particulate, Air Filter Units
--------	--

1.2 DEFINITIONS

1.2.1 ACM

Asbestos Containing Materials.

1.2.2 Amended Water

Water containing a wetting agent or surfactant with a maximum surface tension of 2.9 Pa when tested in accordance with ASTM D 1331.

1.2.3 Area Sampling

Sampling of asbestos fiber concentrations which approximates the concentrations of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.

1.2.4 Asbestos

The term asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, and actinolite asbestos and any of these minerals that has been chemically treated or altered. Materials are considered to contain asbestos if the asbestos content of the material is determined to be at least one percent.

1.2.5 Asbestos Control Area

That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris.

1.2.6 Asbestos Fibers

Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by National Institute for Occupational Safety and

Health (NIOSH) Method 7400.

1.2.7 Asbestos Permissible Exposure Limit

0.1 fibers per cubic centimeter of air as an 8-hour time weighted average measured in the breathing zone as defined by 29 CFR 1926.1101 or other Federal legislation having legal jurisdiction for the protection of workers health.

1.2.8 Background

The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

1.2.9 Contractor

The Contractor is that individual, or entity under contract to perform the herein listed work.

1.2.10 Encapsulation

The abatement of an asbestos hazard through the appropriate use of chemical encapsulants.

1.2.11 Encapsulants

Specific materials in various forms used to chemically or physically entrap asbestos fibers in various configurations to prevent these fibers from becoming airborne. There are four types of encapsulants as follows which must comply with performance requirements as specified herein.

- a. Removal Encapsulant (can be used as a wetting agent)
- b. Bridging Encapsulant (used to provide a tough, durable surface coating to asbestos containing material)
- c. Penetrating Encapsulant (used to penetrate the asbestos containing material encapsulating all asbestos fibers and preventing fiber release due to routine mechanical damage)
- d. Lock-Down Encapsulant (used to seal off or "lock-down" minute asbestos fibers left on surfaces from which asbestos containing material has been removed).

1.2.12 Friable Asbestos Material

One percent asbestos containing material that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

1.2.13 Glovebag Technique

Those asbestos removal and control techniques put forth in 29 CFR 1926.1101 Appendix G.

1.2.14 HEPA Filter Equipment

High efficiency particulate air (HEPA) filtered vacuum and/or exhaust

ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.

1.2.15 NASA Consultant (NC)

That qualified person employed directly by the Government to monitor, sample, inspect the work or in some other way advise the Contracting Officer. The NC is normally a private consultant, but can be an employee of the Government.

1.2.16 Negative Pressure Enclosure (NPE)

That engineering control technique described as a negative pressure enclosure in 29 CFR 1926.1101.

1.2.17 Nonfriable Asbestos Material

Material that contains asbestos in which the fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage or transportation. It is understood that asbestos fibers may be released under other conditions such as demolition, removal, or mishap.

1.2.18 Personal Sampling

Air sampling which is performed to determine asbestos fiber concentrations within the breathing zone of a specific employee, as performed in accordance with 29 CFR 1926.1101.

1.2.19 Private Qualified Person (PQP)

That qualified person hired by the Contractor to perform the herein listed tasks.

1.2.20 Qualified Person (QP)

A Registered Architect, Professional Engineer, Certified Industrial Hygienist, consultant or other qualified person who has successfully completed training and is therefore accredited under a legitimate State Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer; and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The QP must be qualified to perform visual inspections as indicated in ASTM E 1368. The QP shall be appropriately licensed in the State of Ohio.

1.2.21 TEM

Refers to Transmission Electron Microscopy.

1.2.22 Time Weighted Average (TWA)

The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers.

1.2.23 Wetting Agent

A chemical added to water to reduce the water's surface tension thereby increasing the water's ability to soak into the material to which it is applied. An equivalent wetting agent must have a surface tension of at most 2.9 Pa when tested in accordance with ASTM D 1331.

1.3 REQUIREMENTS

1.3.1 Description of Work

The work covered by this section includes the handling and control of asbestos containing materials and describes some of the resultant procedures and equipment required to protect workers, the environment and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of any asbestos containing materials generated by the work. More specific operational procedures shall be outlined in the Asbestos Hazard Abatement Plan called for elsewhere in this specification. The asbestos work includes the demolition and removal of roofing material located at Buildings 4, 7, 8, 11, 12, 24, 34, 35-1, 53, 54 and 95. Under normal conditions non-friable or chemically bound materials containing asbestos would not be considered hazardous; however, this material may release airborne asbestos fibers during demolition and removal and therefore must be handled in accordance with the removal and disposal procedures as specified herein. Provide work practices and engineering control techniques as outlined in this specification. The Government will evacuate the work area during the asbestos abatement work.

1.3.2 Medical Requirements

Provide medical requirements including but not limited to medical surveillance and medical record keeping as listed in 29 CFR 1926.1101.

1.3.2.1 Medical Examinations

Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101 or other pertinent State or local directives. This requirement must have been satisfied within the 12 months prior to the start of work on this contract.

The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. Specifically identify x-ray films of asbestos workers to the consulting radiologist and mark medical record jackets with the word "ASBESTOS."

1.3.2.2 Medical Records

Maintain complete and accurate records of employees' medical examinations, medical records, and exposure data for a period of 50 years after termination of employment and make records of the required medical examinations and exposure data available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health (OSHA), or authorized representatives of them, and an employee's physician upon the request of the employee or former employee.

1.3.3 Training

Train all personnel involved in the asbestos control work in accordance with United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA) training criteria or State training criteria whichever is more stringent. The Contractor shall document the training by providing: dates of training, training entity, course outline, names of instructors, and qualifications of instructors upon request by the Contracting Officer. Furnish each employee with respirator training and fit testing administered by the PQP as required by 29 CFR 1926.1101. Fully cover engineering and other hazard control techniques and procedures.

1.3.4 Permits, Licenses, and Notifications

Obtain necessary permits and licenses in conjunction with asbestos removal, encapsulation, hauling, and disposition, and furnish notification of such actions required by Federal, State, regional, and local authorities prior to the start of work. Notify the State's environmental protection agency and the Contracting Officer in writing 10 working days prior to commencement of work in accordance with 40 CFR 61-SUBPART M.

1.3.5 Environment, Safety and Health Compliance

In addition to detailed requirements of this specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of Federal, State, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1926.1101, 40 CFR 61-SUBPART A, and 40 CFR 61-SUBPART M. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirement as defined by the Government shall apply. The following laws, ordinances, criteria, rules and regulations regarding removal, handling, storing, transporting and disposing of asbestos materials apply:

- a. Ohio Department of Health, Asbestos Abatement Rules, Chapter 3701-34, Ohio Administrative Code
- b. Ohio Environmental Protection Agency, Asbestos Emission Control, Chapter 3745-20, Ohio Administrative Code
- c. Glenn Environmental Programs Manual
[HHTTP://OSAT.GRC.NASA.GOV/EPM/EPMTOC.HTM](http://OSAT.GRC.NASA.GOV/EPM/EPMTOC.HTM)
- d. Glenn Safety Manual [HTTP://OSAT.GRC.NASA.GOV/LSM/LSM_idx.HTM](http://OSAT.GRC.NASA.GOV/LSM/LSM_idx.HTM)

1.3.6 Respiratory Protection Program

Establish and implement a respirator program as required by ANSI Z88.2, 29 CFR 1926.1101, and 29 CFR 1926.103. Submit a written description of the program to the Contracting Officer.

1.3.7 Asbestos Hazard Control Supervisor

The Contractor shall be represented on site by a supervisor, trained using the model Contractor accreditation plan as indicated in the Federal statutes for all portions of the herein listed work.

1.3.8 Hazard Communication

Adhere to all parts of 29 CFR 1926.59 and provide the Contracting Officer with a copy of the Material Safety Data Sheets (MSDS) for all materials brought to the site.

1.4 SUBMITTALS

Submit the following in accordance with section entitled "Submittal Procedures."

1.4.1 SD-02, Manufacturer's Catalog Data

- a. Local exhaust equipment
- b. Vacuums
- c. Respirators
- d. Pressure differential automatic recording instrument
- e. Amended water
- f. Material Safety Data Sheets (MSDS) for all materials proposed for transport to the project site
- g. Encapsulants

1.4.2 SD-08, Statements

- a. Asbestos hazard abatement plan
- b. Testing laboratory
- c. Private qualified person documentation
- d. Landfill approval
- e. Employee training
- f. Medical certification requirements
- g. Waste shipment records and if applicable exemption report
- h. Respiratory Protection Program
- i. Hazardous waste manifest

1.4.2.1 Asbestos Hazard Abatement Plan

Submit a detailed plan of the safety precautions such as lockout, tagout, tryout, fall protection, and confined space entry procedures and equipment and work procedures to be used in the removal of materials containing asbestos. The plan shall be prepared, signed, and sealed by the PQP. Such plan shall include but not be limited to the precise personal protective equipment to be used including, but not limited to, respiratory protection, type of whole-body protection the location of asbestos control areas including clean and dirty areas, buffer zones, showers, storage areas,

change rooms, removal method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent and asbestos sealer to be used, locations of local exhaust equipment, planned air monitoring strategies, and a detailed description of the method to be employed in order to control environmental pollution. The plan shall also include (both fire and medical emergency) response plans. The Asbestos Hazard Abatement Plan must be approved in writing prior to starting any asbestos work. The Contractor, Asbestos Hazard Control Supervisor, and PQP shall meet with the Contracting Officer prior to beginning work, to discuss in detail the Asbestos Hazard Abatement Plan, including work procedures and safety precautions. Once approved by the Contracting Officer, the plan will be enforced as if an addition to the specification. Any changes required in the specification as a result of the plan shall be identified specifically in the plan to allow for free discussion and approval by the Contracting Officer prior to starting work.

1.4.2.2 Testing Laboratory

Submit the name, address, and telephone number of each testing laboratory selected for the sampling, analysis, and reporting of airborne concentrations of asbestos fibers along with evidence that each laboratory selected holds the appropriate State license and/or permits and certification that each laboratory is American Industrial Hygiene Association (AIHA) accredited and that persons counting the samples have been judged proficient by current inclusion on the AIHA Asbestos Analysis Registry (AAR) and successful participation of the laboratory in the Proficiency Analytical Testing (PAT) Program. Where analysis to determine asbestos content in bulk materials or transmission electron microscopy is required, submit evidence that the laboratory is accredited by the National Institute of Science and Technology (NIST) under National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis.

1.4.2.3 Private Qualified Person Documentation

Submit the name, address, and telephone number of the Private Qualified Person (PQP) selected to prepare the Asbestos Hazard Abatement Plan, direct monitoring and training, and documented evidence that the PQP has successfully completed training in and is accredited and where required is certified as, a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer as described by 40 CFR 763 and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The PQP shall be appropriately licensed in the State of Ohio.

1.4.2.4 Landfill Approval

Submit written evidence that the landfill for disposal is approved for asbestos disposal by the State regulatory agency(s). Submit to the Contracting Officer, waste shipment records, prepared in accordance with Federal regulations, signed and dated by an agent of the landfill, certifying the amount of asbestos materials delivered to the landfill, within 3 days after delivery. In those States that require a hazardous waste manifest the Contractor shall submit, within 3 days, signed copies of such to the Contracting Officer.

1.4.2.5 Employee Training

Submit certificates signed by each employee indicating that the employee

has received training in the proper handling of materials and wastes that contain asbestos in accordance with 40 CFR 763; understands the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of the respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory equipment as indicated in 29 CFR 1926.1101 on an initial and annual basis.

1.4.2.6 Medical Certification

Provide a written certification for each worker and supervisor, signed by a licensed physician indicating that the worker and supervisor has met or exceeded all of the medical prerequisites listed herein and in 29 CFR 1926.1101 and 29 CFR 1926.103 as prescribed by law.

1.4.2.7 Respiratory Protection Program

Submit a written program manual or operating procedure including methods of compliance with regulatory statutes.

1.4.3 SD-12, Field Test Reports

- a. Air sampling results
- b. Pressure differential recordings for local exhaust system
- c. Asbestos disposal quantity report
- d. Encapsulation test patches
- e. Clearance sampling

1.4.3.1 Air Sampling Results

Complete fiber counting and provide results to the PQP and NC for review within 16 hours of the "time off" of the sample pump. Notify the Contracting Officer immediately of any airborne levels of asbestos fibers in excess of the acceptable limits. Submit sampling results to the Contracting Officer and the affected Contractor employees where required by law within 3 working days, signed by the testing laboratory employee performing air sampling, the employee that analyzed the sample, and the PQP and NC. Notify the Contractor and the Contracting Officer immediately of any variance in the pressure differential which could cause adjacent unsealed areas to have asbestos fiber concentrations in excess of 0.01 fibers per cubic centimeter or background whichever is higher. In no circumstance shall levels exceed 0.1 fibers per cubic centimeter.

1.4.3.2 Pressure Differential Recordings for Local Exhaust System

Provide a local exhaust system that creates a negative pressure of at least 0.51 mm of water relative to the pressure external to the enclosure and operate it continuously, 24 hours a day, until the temporary enclosure of the asbestos control area is removed. Submit pressure differential recordings for each work day to the PQP and NC for review and to the Contracting Officer within 24 hours from the end of each work day.

1.4.4 SD-13, Certificates

- a. Vacuums

- b. Water filtration equipment
- c. Ventilation systems
- d. Other equipment used to contain airborne asbestos fibers
- e. Chemical encapsulants sealers

Show compliance with ANSI Z9.2 by providing manufacturers' certifications.

1.4.5 SD-18, Records

- a. Notifications
- b. Rental equipment
- c. Respirator program records
- d. Permits and licenses

1.4.5.1 Notifications

Notify the Contracting Officer and other appropriate Government agencies in writing 10 working days prior to the start of asbestos work as indicated in applicable laws, ordinances, criteria, rules, and regulations.

1.4.5.2 Rental Equipment

Provide a copy of the written notification to the rental company concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

1.4.5.3 Respirator Program Records

Submit records of the respirator program as required by ANSI Z88.2, 29 CFR 1926.103, and 29 CFR 1926.1101.

PART 2 PRODUCTS

2.1 ENCAPSULANTS

Shall conform to current USEPA requirements, shall contain no toxic or hazardous substances as defined in 29 CFR 1926.59, and shall conform to the following performance requirements.

2.1.1 Removal Encapsulants

<u>Requirement</u>	<u>Test Standard</u>
Flame Spread - 25, Smoke Emission - 50	ASTM E 84
Life Expectancy - 20 years	ASTM C 732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E 96

2.1.2 Bridging Encapsulant

<u>Requirement</u>	<u>Test Standard</u>
Flame Spread - 25, Smoke Emission - 50	ASTM E 84
Life Expectancy - 20 years	ASTM C 732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E 96
Fire Resistance - Negligible affect on fire resistance rating over 3 hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E 119
Impact Resistance - Minimum 245.5 mm/N Gardner Impact Test	ASTM D 2794
Flexibility - no rupture or cracking	ASTM D 522 Mandrel Bend Test

2.1.3 Penetrating Encapsulant

<u>Requirement</u>	<u>Test Standard</u>
Flame Spread - 25, Smoke Emission - 50	ASTM E 84
Life Expectancy - 20 years	ASTM C 732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E 96
Cohesion/Adhesion Test - 729.5 N of force/meter	ASTM E 736
Fire Resistance - Negligible affect on fire resistance rating over 3 hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E 119
Impact Resistance - Minimum 245.5 mm/N Gardner Impact Test	ASTM D 2794
Flexibility - no rupture or cracking	ASTM D 522 Mandrel Bend Test

2.1.4 Lock-down Encapsulant

<u>Requirement</u>	<u>Test Standard</u>
Flame Spread: 25, Smoke Emission - 50	ASTM E 84
Life Expectancy: 20 years	ASTM C 732 Accelerated Aging Test

<u>Requirement</u>	<u>Test Standard</u>
Permeability: Minimum 0.4 perms	ASTM E 96
Fire Resistance: Negligible affect on fire resistance rating over 3 hour test (Tested with fireproofing over encapsulant applied directly to steel member)	ASTM E 119
Bond Strength: 1459 N of force/meter (Tests compatibility with cementitious and fibrous fireproofing)	ASTM E 736

PART 3 EXECUTION

3.1 EQUIPMENT

At all times, provide the Contracting Officer or the Contracting Officer's Representative, with at least two complete sets of personal protective equipment as required for entry to and inspection of the asbestos control area. Provide equivalent training to the Contracting Officer or a designated representative as provided to Contractor employees in the use of the required personal protective equipment. Provide manufacturer's certificate of compliance for all equipment used to contain airborne asbestos fibers.

3.1.1 Respirators

Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

3.1.1.1 Respirators for Handling Asbestos

Provide personnel engaged in pre-cleaning, cleanup, handling, removal of asbestos materials with respiratory protection as indicated in 29 CFR 1926.1101 and 29 CFR 1926.103.

3.1.2 Exterior Whole Body Protection

3.1.2.1 Outer Protective Clothing

Provide personnel exposed to asbestos with disposable "non-breathable," whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but shall not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape.

3.1.2.2 Work Clothing

Provide cloth work clothes for wear under the outer protective clothing and foot coverings and either dispose of or properly decontaminate them as recommended by the PQP after each use.

3.1.2.3 Personal Decontamination Unit

Provide a temporary, negative pressure unit with a separate decontamination locker room and clean locker room with a shower that complies with 29 CFR 1926.51(f)(4)(ii) through (V) in between for personnel required to wear whole body protective clothing. Provide two separate lockers for each asbestos worker, one in each locker room. Keep street clothing and street shoes in the clean locker. HEPA vacuum and remove asbestos contaminated disposable protective clothing while still wearing respirators at the boundary of the asbestos work area and seal in impermeable bags or containers for disposal. Do not wear work clothing between home and work. Locate showers between the decontamination locker room and the clean locker room and require that all employees shower before changing into street clothes. Collect used shower water and filter with approved water filtration equipment to remove asbestos contamination. Dispose of filters and residue as asbestos waste. Discharge clean water to the sanitary system. Dispose of asbestos contaminated work clothing as asbestos contaminated waste. Decontamination units shall be physically attached to the asbestos control area. Build both a personnel decontamination unit and an equipment decontamination unit onto and integral with each asbestos control area.

3.1.2.4 Eye Protection

Provide goggles to personnel engaged in asbestos abatement operations when the use of a full face respirator is not required.

3.1.3 Warning Signs and Labels

Provide warning signs printed in English at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos.

3.1.3.1 Warning Sign

Provide vertical format conforming to 29 CFR 1926.200, and 29 CFR 1926.1101 minimum 500 by 355 mm displaying the following legend in the lower panel:

<u>Legend</u>	<u>Notation</u>
Danger	25 mm Sans Serif Gothic or Block
Asbestos	25 mm Sans Serif Gothic or Block
Cancer and Lung Disease Hazard	6 mm Sans Serif Gothic or Block
Authorized Personnel Only	6 mm Gothic
Respirators and Protective Clothing are Required in this Area	6 mm Gothic

Spacing between lines shall be at least equal to the height of the upper of

any two lines.

3.1.3.2 Warning Labels

Provide labels conforming to 29 CFR 1926.1101 of sufficient size to be clearly legible, displaying the following legend:

DANGER

CONTAINS ASBESTOS FIBERS

AVOID CREATING DUST

CANCER AND LUNG DISEASE HAZARD

BREATHING ASBESTOS DUST MAY

CAUSE SERIOUS BODILY HARM

3.1.4 Local Exhaust System

Provide a local exhaust system in the asbestos control area in accordance with ANSI Z9.2 and 29 CFR 1926.1101 that will provide at least four air changes per hour inside of the negative pressure enclosure. Local exhaust equipment shall be operated 24 hours per day, until the asbestos control area is removed and shall be leak proof to the filter and equipped with HEPA filters. Maintain a minimum pressure differential in the control area of minus 0.51 mm of water column relative to adjacent, unsealed areas. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. In no case shall the building ventilation system be used as the local exhaust system for the asbestos control area. Filters on exhaust equipment shall conform to ANSI Z9.2 and UL 586. The local exhaust system shall terminate out of doors and remote from any public access or ventilation system intakes.

3.1.5 Tools

Vacuums shall be leak proof to the filter and equipped with HEPA filters. Filters on vacuums shall conform to ANSI Z9.2 and UL 586. Do not use power tools to remove asbestos containing materials unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation systems. Remove all residual asbestos from reusable tools prior to storage or reuse.

3.1.6 Rental Equipment

If rental equipment is to be used, furnish written notification to the rental agency concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

3.2 WORK PROCEDURE

Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61-SUBPART M, and as specified herein. Use wet removal procedures and proper engineering controls and work practice techniques. Personnel shall wear and utilize protective clothing and equipment as specified herein. Eating, smoking, drinking, chewing gum, tobacco, or applying cosmetics shall not be permitted in the asbestos work or control areas. Personnel of other trades not engaged in the removal and demolition of asbestos containing material shall not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection and training

provisions of this specification are complied with by the trade personnel. Seal all roof top penetrations, except plumbing vents, prior to asbestos roofing work. Shut down the building heating, ventilating, and air conditioning system, cap the openings to the system, prior to the commencement of asbestos work. If an asbestos fiber release or spill occurs outside of the asbestos control area, stop work immediately, correct the condition to the satisfaction of the Contracting Officer including clearance sampling, prior to resumption of work.

3.2.1 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent work. Where such work is damaged or contaminated as verified by the Contracting Officer using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the Contractor at no expense to the Government as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust, or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, stop work immediately. Then clean up the spill. When satisfactory visual inspection and air sampling results are obtained from the NC work may proceed at the discretion of the Contracting Officer.

3.2.2 Precleaning

Wet wipe and HEPA vacuum all surfaces potentially contaminated with asbestos prior to establishment of an enclosure.

3.2.3 Asbestos Control Area Requirements

3.2.3.1 Negative Pressure Enclosure

Block and seal openings in areas where the release of airborne asbestos fibers can be expected. Establish an asbestos negative pressure enclosure with the use of curtains, portable partitions, or other enclosures in order to prevent the escape of asbestos fibers from the contaminated asbestos work area. Negative pressure enclosure development shall include protective covering of uncontaminated walls, and ceilings with a continuous membrane of two layers of minimum 0.15 mm plastic sheet sealed with tape to prevent water or other damage. Provide two layers of 0.15 mm plastic sheet over floors and extend a minimum of 300 mm up walls. Seal all joints with tape. Provide local exhaust system in the asbestos control area. Openings will be allowed in enclosures of asbestos control areas for personnel and equipment entry and exit, the supply and exhaust of air for the local exhaust system and the removal of properly containerized asbestos containing materials. Replace local exhaust system filters as required to maintain the efficiency of the system.

3.2.4 Removal Procedures

Wet asbestos material with a fine spray of amended water during removal, cutting, or other handling so as to reduce the emission of airborne fibers. Remove material and immediately place in 0.15 mm plastic disposal bags. Remove asbestos containing material in a gradual manner, with continuous application of the amended water or wetting agent in such a manner that no asbestos material is disturbed prior to being adequately wetted. Where unusual circumstances prohibit the use of 0.15 mm plastic bags, submit an alternate proposal for containment of asbestos fibers to the Contracting Officer for approval. For example, in the case where both piping and insulation are to be removed, the Contractor may elect to wet the

insulation, wrap the pipes and insulation in plastic and remove the pipe by sections. Asbestos containing material shall be containerized while wet. At no time shall asbestos material be allowed to accumulate or become dry. Lower and otherwise handle asbestos containing material as indicated in 40 CFR 61-SUBPART M.

3.2.4.1 Sealing Contaminated Items Designated for Disposal

Remove contaminated architectural, mechanical, and electrical appurtenances such as venetian blinds, full-height partitions, carpeting, duct work, pipes and fittings, radiators, light fixtures, conduit, panels, and other contaminated items designated for removal by completely coating the items with an asbestos lock-down encapsulant at the demolition site before removing the items from the asbestos control area. These items need not be vacuumed. The asbestos lock-down encapsulant shall be tinted a contrasting color. It shall be spray-applied by airless method. Thoroughness of sealing operation shall be visually gauged by the extent of colored coating on exposed surfaces. Lock-down encapsulants shall comply with the performance requirements specified herein.

3.2.4.2 Exposed Pipe Insulation Edges

Contain edges of asbestos insulation to remain that are exposed by a removal operation. Wet and cut the rough ends true and square with sharp tools and then encapsulate the edges with a 6 mm thick layer of non-asbestos containing insulating cement troweled to a smooth hard finish. When cement is dry, lag the end with a layer of non-asbestos lagging cloth, overlapping the existing ends by at least 100 mm. When insulating cement and cloth is an impractical method of sealing a raw edge of asbestos, take appropriate steps to seal the raw edges as approved by the Contracting Officer.

3.2.5 Encapsulation Procedures

3.2.5.1 Preparation of Test Patches

Install three test patches of encapsulant in each building, as indicated. Use airless spray at the lowest pressure and as recommended by the encapsulant manufacturer. Follow exactly the manufacturer's instructions for thinning recommendations, application procedures and rates. Curing time shall be not less than five days or that recommended by the manufacturer, whichever is more. A test patch shall be 0.8 square meter in size.

3.2.5.2 Field Testing

Field test the encapsulation test patches in accordance with ASTM E 1494, paragraph "Required Field Test," in the presence of the Contracting Officer.

Keep a written record of the testing procedures and test results. Upon successful testing of the encapsulant, submit a signed statement to the Contracting Officer certifying that the encapsulant is suitable for installation on the particular asbestos containing material.

3.2.5.3 Large-Scale Application

Apply encapsulant using the same equipment and procedures as employed for the test patches. Keep the encapsulant material stirred to prevent settling. Keep a clean work area. Change pre-filters in the ventilation equipment as soon as they appear clogged by encapsulant aerosol or pressure

differential drops below 0.02 Hg.

3.2.6 Air Sampling

Sampling of airborne concentrations of asbestos fibers shall be performed in accordance with 29 CFR 1926.1101 and as specified herein. Sampling performed in accordance with 29 CFR 1926.1101 shall be performed by the PQP. Sampling performed for environmental and quality control reasons shall be performed by the PQP. Unless otherwise specified, use NIOSH Method 7400 for sampling and analysis. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those results obtained by the Contractor, the Government will determine which results predominate.

3.2.6.1 Sampling Prior to Asbestos Work

Provide area air sampling and establish the baseline one day prior to the masking and sealing operations for each removal site. Establish the background by performing area sampling in similar but uncontaminated sites in the building.

3.2.6.2 Sampling During Asbestos Work

The PQP shall provide personal and area sampling as indicated in 29 CFR 1926.1101 and governing environmental regulations. In addition, provided the same type of work is being performed, provide area sampling at least once every work shift close to the work inside the enclosure, outside the clean room entrance to the enclosure, and at the exhaust opening of the local exhaust system. If sampling outside the enclosure shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the condition(s) causing the increase, and notify the Contracting Officer immediately. Where alternate methods are used, perform personal and area air sampling at locations and frequencies that will accurately characterize the evolving airborne asbestos levels.

3.2.6.3 Sampling After Final Clean-Up (Clearance Sampling)

Provide area sampling of asbestos fibers and establish an airborne asbestos concentration of less than 0.01 fibers per cubic centimeter after final clean-up but before removal of the enclosure or the asbestos work control area. After final cleanup and the asbestos control area is dry but prior to clearance sampling, the PQP and NC shall perform a visual inspection in accordance with ASTM E 1368 to ensure that the asbestos control and work area is free of any accumulations of dirt, dust, or debris. Prepare a written report signed and dated by the PQP documenting that the asbestos control area is free of dust, dirt, and debris and all waste has been removed. The asbestos fiber counts from these samples shall be less than 0.01 fibers per cubic centimeter or be not greater than the background, whichever is greater. Should any of the final samples indicate a higher value, the Contractor shall take appropriate actions to re-clean the area and shall repeat the sampling and analysis at the Contractor's expense.

3.2.7 Lock-Down

Prior to removal of plastic barriers and after pre-clearance clean up of gross contamination, the NC shall conduct a visual inspection of all areas affected by the removal in accordance with ASTM E 1368. Inspect for any

visible fibers.

3.2.8 Site Inspection

While performing asbestos engineering control work, the Contractor shall be subject to on-site inspection by the Contracting Officer who may be assisted by or represented by safety or industrial hygiene personnel. If the work is found to be in violation of this specification, the Contracting Officer or his representative will issue a stop work order to be in effect immediately and until the violation is resolved. All related costs including standby time required to resolve the violation shall be at the Contractor's expense.

3.3 CLEAN-UP AND DISPOSAL

3.3.1 Housekeeping

Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. DO NOT BLOW DOWN THE SPACE WITH COMPRESSED AIR. When asbestos removal is complete, all asbestos waste is removed from the work-site, and final clean-up is completed, the Contracting Officer will attest that the area is safe before the signs can be removed. After final clean-up and acceptable airborne concentrations are attained but before the HEPA unit is turned off and the enclosure removed, remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of filters as asbestos contaminated materials. Reestablish HVAC mechanical, and electrical systems in proper working order. The Contracting Officer will visually inspect all surfaces within the enclosure for residual material or accumulated dust or debris. The Contractor shall re-clean all areas showing dust or residual materials. If re-cleaning is required, air sample and establish an acceptable asbestos airborne concentration after re-cleaning. The Contracting Officer must agree that the area is safe in writing before unrestricted entry will be permitted. The Government shall have the option to perform monitoring to determine if the areas are safe before entry is permitted.

3.3.2 Title to Materials

All waste materials, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified in applicable local, State, and Federal regulations and herein.

3.3.3 Disposal of Asbestos

3.3.3.1 Procedure for Disposal

Collect asbestos waste, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiber-proof, waterproof, non-returnable containers (e.g. double plastic bags 0.15 mm thick, cartons, drums or cans). Wastes within the containers must be adequately wet in accordance with 40 CFR 61-SUBPART M. Affix a warning and Department of Transportation (DOT) label to each container including the bags or use at least 0.15 mm thick bags with the approved warnings and DOT labeling preprinted on the bag. The name of the waste generator and the location at which the waste was generated shall be clearly indicated on the

outside of each container. Prevent contamination of the transport vehicle (especially if the transport vehicle is a rented truck likely to be used in the future for non-asbestos purposes). These precautions include lining the vehicle cargo area with plastic sheeting (similar to work area enclosure) and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete. Dispose of waste asbestos material at an Environmental Protection Agency (EPA) or State-approved asbestos landfill off Government property. For temporary storage, store sealed impermeable bags in asbestos waste drums or skids. An area for interim storage of asbestos waste-containing drums or skids will be assigned by the Contracting Officer or his authorized representative. Procedure for hauling and disposal shall comply with 40 CFR 61-SUBPART M, State, regional, and local standards. Sealed plastic bags may be dumped from drums into the burial site unless the bags have been broken or damaged. Damaged bags shall remain in the drum and the entire contaminated drum shall be buried. Uncontaminated drums may be recycled. Workers unloading the sealed drums shall wear appropriate respirators and personal protective equipment when handling asbestos materials at the disposal site.

3.3.3.2 Asbestos Disposal Quantity Report

Direct the PQP to record and report, to the Contracting Officer, the amount of asbestos containing material removed and released for disposal. Deliver the report for the previous day at the beginning of each day shift with amounts of material removed during the previous day reported in linear meters or square meters as described initially in this specification and in cubic meters for the amount of asbestos containing material released for disposal.

Allow the NC to inspect, record and report the amount of asbestos containing material removed and released for disposal on a daily basis.

3.4 ENVIRONMENTAL SURVEY REPORT

-- End of Section --

SECTION 13282

LEAD PAINT ABATEMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z88.2 (1992) Respiratory Protection

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1926.21 Safety Training and Education
29 CFR 1926.55 Gases, Vapors, Fumes, Dusts, and Mists
29 CFR 1926.59 Hazard Communication
29 CFR 1926.62 Lead Exposure in Construction
29 CFR 1926.65 Hazardous Waste Operations and Emergency Response
29 CFR 1926.103 Respiratory Protection
40 CFR 260 Hazardous Waste Management Systems: General
40 CFR 261 Identification and Listing of Hazardous Waste
40 CFR 262 Generators of Hazardous Waste
40 CFR 263 Transporters of Hazardous Waste
40 CFR 264 Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265 Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268 Land Disposal Restrictions
40 CFR 745 Lead; Requirements for Lead-Based Paint Activities
49 CFR 172 Hazardous Materials, Tables, and Hazardous Materials Communications Regulations
49 CFR 178 Shipping Container Specification

UNDERWRITERS LABORATORIES INC. (UL)

UL 586 (1990) High-Efficiency, Particulate, Air Filter Units

1.2 DEFINITIONS

1.2.1 Action Level

Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8 hour period in an occupational/industrial environment.

1.2.2 Area Sampling

Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel.

1.2.3 Competent Person (CP)

As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations. An industrial hygienist or safety professional certified for comprehensive practice by the American Board of Industrial Hygiene or by the Board of Certified Safety Professionals is the best choice.

1.2.4 Contaminated Room

Room for removal of contaminated personal protective equipment (PPE).

1.2.5 Decontamination Shower Facility

That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

1.2.6 Eight-Hour Time Weighted Average (TWA)

Airborne concentration of lead to which an employee is exposed, averaged over an 8 hour workday as indicated in 29 CFR 1926.62.

1.2.7 High Efficiency Particulate Air (HEPA) Filter Equipment

HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron or larger size particles.

1.2.8 Lead

Metallic lead, inorganic lead compounds, and organic lead soaps.

1.2.9 Lead Based Paint (LBP)

Protective or decorative coating which contains lead.

1.2.10 Lead Control Area

An enclosed area or structure, constructed as a temporary containment equipped with HEPA filtered local exhaust, which prevents the spread of lead dust, paint chips, or debris existing as a condition of lead based paint removal operations. The lead control area is also isolated by physical boundaries to prevent unauthorized entry of personnel.

1.2.11 Lead Permissible Exposure Limit (PEL)

Fifty micrograms per cubic meter of air as an 8 hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a work day, the PEL shall be determined by the following formula:

$$\text{PEL (micrograms/cubic meter of air)} = 400/\text{No. hrs worked per day}$$

1.2.12 Personal Sampling

Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8 hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees' work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 150 to 225 mm and centered at the nose or mouth of an employee.

1.2.13 Physical Boundary

Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area but inside boundary."

1.3 QUALITY ASSURANCE

1.3.1 Medical Examinations

Before exposure to lead-contaminated dust, provide workers with a comprehensive medical examination as required by 29 CFR 1926.62 and 29 CFR 1926.103. The examination will not be required if adequate records show that employees have been examined as required by 29 CFR 1926.62 within the last year.

1.3.1.1 Medical Records

Maintain complete and accurate medical records of employees for a period of at least 30 years or for the duration of employment plus 30 years, whichever is longer.

1.3.1.2 Medical Surveillance

Provide medical surveillance to all personnel exposed to lead as indicated in 29 CFR 1926.62.

1.3.2 Competent Person (CP) Responsibilities

- a. Certify training as meeting all federal, State, and local requirements.

- b. Review and approve lead based paint removal plan for conformance to the applicable referenced standards.
- c. Continuously inspect lead based paint removal work for conformance with the approved plan.
- d. Perform air and wipe sampling.
- e. Ensure work is performed in strict accordance with specifications at all times.
- f. Control work to prevent hazardous exposure to human beings and to the environment at all times.
- g. Certify the conditions of the work as called for elsewhere in this specification.

1.3.3 Training

Train each employee performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 29 CFR 1926.21, 29 CFR 1926.62, and State and local regulations.

1.3.3.1 Training Certification

Submit a certificate for each employee, signed and dated by the approved training source, stating that the employee has received the required lead training.

1.3.4 Respiratory Protection Program

- a. Furnish each employee required to wear a negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least every six months thereafter as required by 29 CFR 1926.62.
- b. Establish and implement a respiratory protection program as required by ANSI Z88.2, 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55.

1.3.5 Hazard Communication Program

Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

1.3.6 Hazardous Waste Management

The Hazardous Waste Management Plan shall comply with applicable requirements of federal, State, and local hazardous waste regulations and address:

- a. Identification and classification of hazardous wastes associated with the work.
- b. Estimated quantities of wastes to be generated and disposed of.
- c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes.

Include the facility location and operator and a 24-hour point of contact. Furnish two copies of State and local hazardous waste permits, manifests and EPA Identification numbers.

- d. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.
- e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.
- f. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.
- g. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily.
- h. Cost for hazardous waste disposal according to this plan.

1.3.7 Safety and Health Compliance

In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of Federal, State, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1926.62. Submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirement shall apply. The following State laws, ordinances, criteria, rules and regulations regarding removing, handling, storing, transporting, and disposing of lead-contaminated materials apply:

- a. Ohio Administrative Code, OAC, Chapter 3647-51
- b. Ohio Hazardous Waste Regulations

1.3.8 Pre-Construction Conference

Along with the CP, meet with the Contracting Officer to discuss in detail the hazardous waste management plan and the lead based paint removal plan, including work procedures and precautions for the removal plan.

1.4 DESCRIPTION OF WORK

Remove 3 square meters of lead based paint in good condition, located on existing painted metal flashings located on Buildings 4, 7, 8, 11, 12, 24, 34, 35-1, 53, 54, and 95 as indicated on the drawings.

1.5 SUBMITTALS

Submit the following in accordance with section entitled "Submittal Procedures".

1.5.1 SD-02, Manufacturer's Catalog Data

- a. Vacuum filters

b. Respirators

1.5.2 SD-06, Instructions

- a. Chemicals and equipment
- b. Materials
- c. Material safety data sheets for all chemicals

1.5.3 SD-08, Statements

- a. Qualifications of CP
- b. Testing laboratory and consultant qualifications
- c. Lead based paint removal plan including CP approval (signature, date, and certification number)
- d. Rental equipment notification
- e. Respiratory protection program
- f. Hazard communication program
- g. EPA approved hazardous waste treatment or disposal facility for lead disposal
- h. Hazardous waste management plan

1.5.3.1 Qualifications of CP

Submit name, address, and telephone number of the CP selected to perform responsibilities specified in paragraph entitled "Competent Person (CP) Responsibilities." Provide previous experience of the CP. Submit proper documentation that the CP is trained and licensed in accordance with federal, State, and local laws.

1.5.3.2 Testing Laboratory and Consultant

Submit the name, address, and telephone number of the testing laboratory and consultant selected to perform the sampling, testing, and reporting of airborne concentrations of lead. Use a laboratory accredited under the EPA National Lead Laboratory Accreditation Program (NLLAP) by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis.

1.5.3.3 Lead Based Paint Removal Plan (LBPRP)

Submit a detailed job-specific plan of the work procedures to be used in the removal of LBP. The plan shall include a sketch showing the location, size, and details of lead control areas, location and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include in the plan, eating, drinking, smoking and sanitary procedures, interface of trades, sequencing of lead related work, collected waste water and paint debris disposal plan, air sampling plan, respirators, personal protective equipment, and a detailed description of the method of

containment of the operation to ensure that airborne lead concentrations of 30 micrograms per cubic meter of air and baseline lead dust concentrations are not reached or exceeded outside of the lead control area. Include occupational and environmental sampling, training and strategy, sampling methodology, frequency, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan.

1.5.4 SD-12, Field Test Reports

a. Sampling results

1.5.4.1 Occupational and Environmental Sampling Results

Submit occupational and environmental sampling results to the Contracting Officer within three working days of collection, signed by the testing laboratory employee performing the analysis, the employee that performed the sampling, and the CP.

1.5.5 SD-13, Certificates

a. Vacuum filters

1.5.6 SD-18, Records

a. Completed and signed hazardous waste manifest from treatment or disposal facility

b. Certification of medical examinations

c. Employee training certification

1.6 REMOVAL

1.6.1 Title to Materials

Materials resulting from demolition work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of in accordance with Section 01350, except as specified herein.

1.7 EQUIPMENT

1.7.1 Respirators

Furnish appropriate respirators approved by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead dust. Respirators shall comply with the requirements of 29 CFR 1926.62.

1.7.2 Special Protective Clothing

Furnish personnel who will be exposed to lead-contaminated dust with proper disposable protective whole body clothing, head covering, gloves, and foot coverings as required by 29 CFR 1926.62. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.

1.7.3 Rental Equipment Notification

If rental equipment is to be used during lead based paint handling and disposal, notify the rental agency in writing concerning the intended use of the equipment. Furnish a copy of the written notification to the Contracting Officer.

1.7.4 Vacuum Filters

UL 586 labeled HEPA filters.

1.7.5 Equipment for Government Personnel

Furnish the Contracting Officer with two complete sets of personal protective equipment (PPE) daily, as required herein, for entry into and inspection of the paint removal work within the lead controlled area. Personal protective equipment shall include disposable whole body covering, including appropriate foot, head, and hand protection. PPE shall remain the property of the Contractor. Respiratory protection for the Contracting Officer will be provided by the Government.

PART 2 PRODUCTS

2.1 CHEMICALS

Submit applicable Material Safety Data Sheets for all chemicals used in paint removal work. Use the least toxic product approved by the Contracting Officer.

2.2 MATERIALS

The soluble metal content and the total metal content shall not exceed values which would cause a material to be classified as a hazardous waste.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Notification

Notify the Contracting Officer 20 days prior to the start of any paint removal work.

3.1.2 Lead Control Area Requirements

Establish a lead control area by completely enclosing with containment screens the area or structure where lead based paint removal operations will be performed.

3.1.3 Protection of Existing Work to Remain

Perform paint removal work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better.

3.1.4 Boundary Requirements

Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions

or other enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.

3.1.5 Heating, Ventilating and Air Conditioning (HVAC) Systems

Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 0.15 mm plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area.

3.1.6 Personnel Protection

Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.

3.1.7 Warning Signs

Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

3.2 WORK PROCEDURES

Perform removal of lead based paint in accordance with approved lead based paint removal plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead based paint is removed in accordance with 29 CFR 1926.62, except as specified herein. Dispose of removed paint chips and associated waste in compliance with Environmental Protection Agency (EPA), federal, State, and local requirements.

3.2.1 Personnel Exiting Procedures

Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day:

- a. Vacuum themselves off.
- b. Remove protective clothing in the contaminated change room, and place them in an approved impermeable disposal bag.
- c. Change to clean clothes prior to leaving the physical boundary designated around the lead control area.

3.2.2 Air and Wipe Sampling

Air sample for lead in accordance with 29 CFR 1926.62 and as specified herein. Air and wipe sampling shall be directed or performed by the CP.

- a. The CP shall be on the job site directing the air and wipe sampling and inspecting the lead based paint removal work to ensure that the requirements of the contract have been satisfied during the entire lead based paint removal operation.

- b. Collect personal air samples on employees who are anticipated to have the greatest risk of exposure as determined by the CP. In addition, collect air samples on at least twenty-five percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.
- c. Submit results of air samples, signed by the CP, within 72 hours after the air samples are taken. Notify the Contracting Officer immediately of exposure to lead at or in excess of the action level of 30 micrograms per cubic meter of air outside of the lead control area.
- d. Before any work begins, collect and analyze baseline wipe samples in accordance with methods defined in federal, State, and local standards inside and outside of the physical boundary to assess the degree of dust contamination in the facility prior to lead based paint removal.

3.2.2.1 Air Sampling During Paint Removal Work

Conduct area air sampling daily, on each shift in which lead based paint removal operations are performed, in areas immediately adjacent to the lead control area. Sufficient area monitoring shall be conducted to ensure unprotected personnel are not exposed at or above 30 micrograms per cubic meter of air. If 30 micrograms per cubic meter of air is reached or exceeded, stop work, correct the condition(s) causing the increased levels. Notify the Contracting Officer immediately. Determine if condition(s) require any further change in work methods. Removal work shall resume only after approval is given by the CP and the Contracting Officer. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the lead control area.

3.2.3 Lead Based Paint Removal

Manual or power sanding of interior and exterior surfaces is not permitted.

Provide methodology for removing LBP in work plan. Remove paint within the areas designated on the drawings in order to completely expose the substrate. Take whatever precautions necessary to minimize damage to the underlying substrate.

Select paint removal processes to minimize contamination of work areas with lead-contaminated dust or other lead-contaminated debris/waste. Describe this paint removal process in the lead based paint removal plan. Perform manual wet sanding and scraping to the maximum extent feasible.

3.2.3.1 Outdoor Lead Paint Removal

Perform outdoor LBP removal as indicated in federal, State, and local regulations and in the work plan.

3.2.3.2 Air and Wipe Sampling After Paint Removal

After the visual inspection, collect air samples inside and outside the lead control area to determine the airborne levels of lead inside and outside the work area. Collect wipe samples according to the HUD protocol to determine the lead content of settled dust and dirt in micrograms per square foot of surface area.

3.2.4 Cleanup and Disposal

3.2.4.1 Cleanup

Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the CP. Reclean areas showing dust or residual paint chips or debris. After visible dust, chips and debris is removed, wet wipe and HEPA vacuum all surfaces in the work area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The CP shall then certify in writing that the area has been cleaned of lead contamination before restarting work.

3.2.4.2 Certification

The CP shall certify in writing that the final air samples collected inside and outside the lead control area are less than 30 micrograms per cubic meter of air; the respiratory protection used for the employees was adequate; the work procedures were performed in accordance with 29 CFR 1926.62 and 40 CFR 745; and that there were no visible accumulations of lead based paint and dust left in the work site. Do not remove the lead control area or roped off boundary and warning signs prior to the Contracting Officer's acknowledgement of receipt of the CP certification.

3.2.4.3 Testing of Lead Based Paint Residue and Used Abrasive

Test lead containing paint residue and used abrasive in accordance with 40 CFR 261 for hazardous waste.

3.2.4.4 Disposal

- a. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing which may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62 and 40 CFR 261. Dispose of lead-contaminated waste material at an State approved hazardous waste treatment, storage, or disposal facility off Government property.
- b. Store waste materials in U.S. Department of Transportation (49 CFR 178) approved 208 liter drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled. The Contracting Officer or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.
- c. Handle, store, transport, and dispose lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

3.2.5 Disposal Documentation

Submit written evidence that the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA and State or local regulatory agencies. Submit one copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR 262.

3.2.6 Payment for Hazardous Waste

Payment for disposal of hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-containing materials delivered is returned and a copy is furnished to the Government.

-- End of Section --

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.7489 WHITE PINE ROAD - RICHMOND, VA 23237
804-275-4788 FAX 804-275-4907**BULK ASBESTOS SAMPLE ANALYSIS SUMMARY**

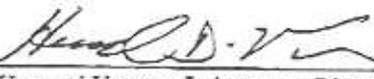
CLIENT: Osborn/Warner/Madison Joint Venture DATE OF RECEIPT: 14 AUG 2000
1300 E. Ninth Street, Suite 1510 DATE OF ANALYSIS: 14 AUG 2000
Cleveland, OH 44114-1503 DATE OF REPORT: 14 AUG 2000

CLIENT NUMBER: 36-4384 D
EHS PROJECT #: 08-00-1705
PROJECT: 6011-004

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
01	4-7/24/00-001A/ Black Fib.	5% Chrysotile 5% Total Asbestos	10% Cellulose 85% Non-Fibrous
02	4-7/24/00-001B/ Gray Gran.	NAD	100% Non-Fibrous
03	4-7/24/00-002A/ Black Fib.	5% Chrysotile 5% Total Asbestos	10% Cellulose 85% Non-Fibrous
04	4-7/24/00-002B/ Gray Gran.	NAD	100% Non-Fibrous
05	4-7/24/00-003A/ Black Fib.	NAD	5% Cellulose 95% Non-Fibrous
06	4-7/24/00-003B/ Brown Fib.	NAD	5% Cellulose 10% Fibrous Glass 85% Non-Fibrous

QC SAMPLE: M2-1998-1
REPORTING LIMIT: 1% Asbestos
METHOD: Polarized Light Microscopy, EPA Method 600/R-93/116
ANALYST: Danielle Pearson

Reviewed By Authorized Signatory:


Howard Varner, Laboratory Director
Irma Faszewski, Quality Assurance Coordinator
David Xu, MS, Senior Chemist
Feng Jiang, MS, Senior Geologist

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

CLIENT NUMBER: 86-4884 D
 EHS PROJECT #: 09-00-1511
 PROJECT: 6044-004

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
11	004B/ Gray Fib.	NAD	60% Cellulose 20% Fibrous Glass 20% Non-Fibrous
12	004C/ Gray Fib.	NAD	60% Cellulose 20% Fibrous Glass 20% Non-Fibrous
13	005A/ White Gran.	2% Chrysotile 2% Total Asbestos	18% Cellulose 80% Non-Fibrous
14	005B/ White Gran.	2% Chrysotile 2% Total Asbestos	13% Cellulose 85% Non-Fibrous
15	003C/ White Gran.	2% Chrysotile 2% Total Asbestos	98% Non-Fibrous
16	04-9/13/00-002A/ Black Brittle	NAD	5% Cellulose 95% Non-Fibrous
17	04-9/13/00-002B/ Brown Fib.	NAD	60% Cellulose 20% Non-Fibrous
18	04-9/13/00-002C/ Black Fib.	NAD	30% Cellulose 70% Non-Fibrous
19	04-9/13/00-003A/ Black Soft	2% Chrysotile 2% Total Asbestos	5% Cellulose 93% Non-Fibrous
20	04-9/13/00-003B/ Brown Fib.	NAD	60% Cellulose 40% Non-Fibrous
21	04-9/13/00-003C/ Black Fib.	NAD	20% Cellulose 20% Fibrous Glass 60% Non-Fibrous

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.7489 WHITE PINE ROAD - RICHMOND, VA 23237
804-275-4788 FAX 804-275-4907**BULK ASBESTOS SAMPLE ANALYSIS SUMMARY**

CLIENT: Osborn/Warner/Madison Joint Venture
1300 E. Ninth Street, Suite 1510
Cleveland, OH 44114-1503

DATE OF RECEIPT: 14 AUG 2000
DATE OF ANALYSIS: 14 AUG 2000
DATE OF REPORT: 14 AUG 2000
AMENDED: 16 AUG 2000

CLIENT NUMBER: 38-4384 D
EHS PROJECT #: 08-00-1695
PROJECT: 6011-004; Building #7

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
01	7-07/25/00-001A/ Black Tar-Like	NAD	10% Cellulose 90% Non-Fibrous
02	7-07/25/00-001B/ Brown Fib.	NAD	95% Cellulose 5% Non-Fibrous
03	7-07/25/00-002A/ Black Tar-Like	NAD	10% Cellulose 90% Non-Fibrous
04	7-07/25/00-002B/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous
05	7-07/25/00-003A/ Black Tar-Like	NAD	20% Cellulose 80% Non-Fibrous
06	7-07/25/00-003B/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous

QC SAMPLE: M2-1998-4

REPORTING LIMIT: 1% Asbestos

METHOD: Polarized Light Microscopy, EPA Method 600/R-93/116

ANALYST: Feng Jiang, M.S.

Reviewed By Authorized Signatory:


Howard Varner, Laboratory Director
Irma Faszewski, Quality Assurance Coordinator
David Xu, MS, Senior Chemist
Feng Jiang, MS, Senior Geologist

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

7489 WHITE PINE ROAD - RICHMOND, VA 23237

804-275-4788 FAX 804-275-4907

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: Osborn/Warner/Madison Joint Venture
1300 E. Ninth Street, Suite 1510
Cleveland, OH 44114-1503

DATE OF RECEIPT: 14 AUG 2000
DATE OF ANALYSIS: 14 AUG 2000
DATE OF REPORT: 14 AUG 2000
AMENDED: 16 AUG 2000

CLIENT NUMBER: 36-4384 D
EHS PROJECT #: 08-00-1694
PROJECT: 6011-004; Building #8

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
01	8-07/25/00-001A/ Black Tar-Like	NAD	20% Cellulose 80% Non-Fibrous
02	8-07/25/00-001B/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous
03	8-07/25/00-002A/ Black Tar-Like	NAD	20% Cellulose 80% Non-Fibrous
04	8-07/25/00-002B/ Black Tar-Like	NAD	90% Cellulose 10% Non-Fibrous
05	8-07/25/00-003A/ Black Tar-Like	NAD	30% Cellulose 70% Non-Fibrous
06	8-07/25/00-003B/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous
07	8-07/25/00-004A/ Black Tar-Like	NAD	30% Cellulose 70% Non-Fibrous
08	8-07/25/00-005A/ Black Tar-Like	NAD	30% Cellulose 70% Non-Fibrous
09	8-07/25/00-006A/ Black Tar-Like	NAD	30% Cellulose 70% Non-Fibrous

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

7469 WHITE PINE ROAD - RICHMOND, VA 23237

804-275-4788 FAX 804-275-4907

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: Osborn/Warner/Madison Joint Venture
1300 E. Ninth Street, Suite 1510
Cleveland, OH 44114-1503

DATE OF RECEIPT: 14 AUG 2000
DATE OF ANALYSIS: 14 AUG 2000
DATE OF REPORT: 14 AUG 2000
AMENDED: 16 AUG 2000

CLIENT NUMBER: 36-4384 D
EHS PROJECT #: 08-00-1697
PROJECT: 6011-004: Building #11

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
01	11-07/25/00-001A/ Black Tar-Like	NAD	5% Cellulose 5% Fibrous Glass 90% Non-Fibrous
02	11-07/25/00-001B/ Black Tar-Like	NAD	20% Cellulose 80% Non-Fibrous
03	11-07/25/00-002A/ Black Tar-Like	NAD	20% Cellulose 80% Non-Fibrous
04	11-07/25/00-002B/ Brown Foam; Brown Fib.	NAD	30% Cellulose 70% Non-Fibrous
05	11-07/25/00-003A/ Black Tar-Like	NAD	5% Cellulose 5% Synthetic 90% Non-Fibrous
06	11-07/25/00-003B/ Brown Foam; Black Fib.	NAD	10% Cellulose 90% Non-Fibrous

QC SAMPLE: M2-1998-4

REPORTING LIMIT: 1% Asbestos

METHOD: Polarized Light Microscopy, EPA Method 600/R-93/116

ANALYST: Feng Jiang, M.S.

Reviewed By Authorized Signatory:


Howard Varner, Laboratory Director
Irina Faszewski, Quality Assurance Coordinator
David Xu, MS, Senior Chemist
Feng Jiang, MS, Senior Geologist

ENVIRONMENTAL HAZARDS SERVICES, L.L.C. **FILE COPY**
 7489 WHITE PINE ROAD - RICHMOND, VA 23237
 804-275-4788 FAX 804-275-4907

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: Osborn/Warner/Madison Joint Venture
 1300 E. Ninth Street, Suite 1510
 Cleveland, OH 44114-1503

DATE OF RECEIPT: 14 AUG 2000
DATE OF ANALYSIS: 14 AUG 2000
DATE OF REPORT: 14 AUG 2000

CLIENT NUMBER: 36-4384 D
EHS PROJECT #: 08-00-1698
PROJECT: 6011-004

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
01	12-08/4/00-001a/ Black Fib.	NAD	30% Cellulose 70% Non-Fibrous
02	12-08/4/00-001b/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous
03	12-08/4/00-001c/ Brown Porous	NAD	10% Cellulose 90% Non-Fibrous
04	12-08/4/00-002a/ Black Fib.	NAD	30% Cellulose 70% Non-Fibrous
05	12-08/4/00-002b/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous
06	12-08/4/00-002c/ Brown Fib.	NAD	20% Cellulose 80% Non-Fibrous
07	12-08/4/00-003a/ Black Fib.	NAD	30% Cellulose 10% Fibrous Glass 60% Non-Fibrous
08	12-08/4/00-003b/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous
09	12-08/4/00-003c/ Brown Fib.	NAD	20% Cellulose 80% Non-Fibrous

PM:		JOB #:	
LOG-IN:	Vendor Submittal	Project In	
DIST: Orig.	Proj. File	Individual	
	Sticky Binder	Proj. User	
Copies To:			
Trans. Only:			

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

7489 WHITE PINE ROAD - RICHMOND, VA 23237
 804-275-4788 FAX 804-275-4907

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: Osborn/Warner/Madison Joint Venture
 1300 E. Ninth Street, Suite 1510
 Cleveland, OH 44114-1503

DATE OF RECEIPT: 14 AUG 2000
 DATE OF ANALYSIS: 14 AUG 2000
 DATE OF REPORT: 14 AUG 2000

CLIENT NUMBER: 36-4384 D
 EHS PROJECT #: 08-00-1689
 PROJECT: 6011-004

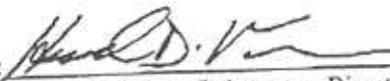
EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
01	24-08/3/00-001a/ Black Fib.	NAD	5% Cellulose 95% Non-Fibrous
02	24-08/3/00-001b/ Brown Powdery	NAD	100% Non-Fibrous
03	24-08/3/00-001c/ Brown Fib.	NAD	55% Cellulose 45% Non-Fibrous
04	24-08/3/00-002a/ Black Fib.	NAD	8% Cellulose 92% Non-Fibrous
05	24-08/3/00-002b/ Brown Powdery	NAD	100% Non-Fibrous
06	24-08/3/00-002c/ Brown Fib.	NAD	55% Cellulose 45% Non-Fibrous
07	24-08/3/00-003a/ Black Fib.	NAD	8% Cellulose 92% Non-Fibrous
08	24-08/3/00-003b/ Brown Powdery	NAD	100% Non-Fibrous
09	24-08/3/00-003c/ Brown Fib.	NAD	55% Cellulose 45% Non-Fibrous
10	24-08/3/00-004a/ Black Tar-Like	NAD	2% Cellulose 98% Non-Fibrous
11	24-08/3/00-004b/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous
12	24-08/3/00-005a/ Black Tar-Like	NAD	100% Non-Fibrous
13	24-08/3/00-005b/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

CLIENT NUMBER: 36-4384 D
 EHS PROJECT #: 08-00-1689
 PROJECT: 6011-004

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
14	24-08/3/00-006a/ Black Tar-Like	NAD	100% Non-Fibrous
15	24-08/3/00-006b/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous
16	24-08/3/00-007a/ Black Tar-Like	NAD	2% Cellulose 98% Non-Fibrous
17	24-08/3/00-007b/ Brown Fib.	NAD	15% Cellulose 85% Non-Fibrous
18	24-08/3/00-007c/ Yellow Foam-Like	NAD	100% Non-Fibrous
19	24-08/3/00-008a/ Black Tar-Like	NAD	5% Cellulose 95% Non-Fibrous
20	24-08/3/00-008b/ Brown Fib.	NAD	15% Cellulose 85% Non-Fibrous
21	24-08/3/00-008c/ Yellow Foam-Like	NAD	100% Non-Fibrous
22	24-08/3/00-009a/ Black Tar-Like	NAD	2% Cellulose 98% Non-Fibrous
23	24-08/3/00-009b/ Brown Fib.	NAD	15% Cellulose 85% Non-Fibrous
24	24-08/3/00-009c/ Yellow Foam-Like	NAD	5% Cellulose 95% Non-Fibrous

QC SAMPLE: M2-1998-1
 REPORTING LIMIT: 1% Asbestos
 METHOD: Polarized Light Microscopy, EPA Method 600/R-93/116
 ANALYST: Danielle Pearson

Reviewed By Authorized Signatory: 
 Howard Varner, Laboratory Director
 Irma Faszewski, Quality Assurance Coordinator
 David Xu, MS, Senior Chemist
 Feng Jiang, MS, Senior Geologist

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

7489 WHITE PINE ROAD - RICHMOND, VA 23237

804-275-4788 FAX 804-275-4907

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: Osborn/Warner/Madison Joint Venture
1300 E. Ninth Street, Suite 1510
Cleveland, OH 44114-1503

DATE OF RECEIPT: 14 AUG 2000
DATE OF ANALYSIS: 14 AUG 2000
DATE OF REPORT: 14 AUG 2000

CLIENT NUMBER: 36-4384 D
EHS PROJECT #: 08-00-1688
PROJECT: 6011-004

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
01	34-07/21/00-001a/ Black/Brown Fib.; Solid	NAD	52% Cellulose 48% Non-Fibrous
02	34-07/21/00-001b/ Brown Fib.	NAD	70% Cellulose 30% Non-Fibrous
03	34-07/21/00-002a/ Black/Brown Fib.	NAD	51% Cellulose 49% Non-Fibrous
04	34-07/21/00-002b/ Brown Fib.	NAD	70% Cellulose 30% Non-Fibrous
05	34-07/21/00-003a/ Black Fib.; Solid	NAD	51% Cellulose 49% Non-Fibrous
06	34-07/21/00-003b/ Brown Fib.	NAD	76% Cellulose 24% Non-Fibrous
07	34-07/21/00-004a/ Black/Brown Fib.; Solid	NAD	52% Cellulose 48% Non-Fibrous
08	34-07/21/00-004b/ Brown Fib.	NAD	74% Cellulose 26% Non-Fibrous
09	34-07/21/00-004c/ Rust/Brown Foam	NAD	3% Cellulose 97% Non-Fibrous
10	34-07/21/00-005a/ Black Fib.; Solid	NAD	52% Cellulose 48% Non-Fibrous
11	34-07/21/00-005b/ Brown Fib.	NAD	75% Cellulose 25% Non-Fibrous
12	34-07/21/00-005c/ Yellow Foam Insulation	NAD	2% Cellulose 98% Non-Fibrous
13	34-07/21/00-006a/ Black Fib.; Solid	NAD	52% Cellulose 48% Non-Fibrous

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

CLIENT NUMBER: 36-4384 D

EHS PROJECT #: 08-00-1688

PROJECT: 6011-004

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
14	34-07/21/00-006b/ Brown Fib.	NAD	72% Cellulose 28% Non-Fibrous
15	34-07/21/00-006c/ Brown Foam Insulation	NAD	100% Non-Fibrous
16	34-07/21/00-007a/ Black Fib.; Solid	NAD	51% Cellulose 49% Non-Fibrous
17	34-07/21/00-007b/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous
18	34-07/21/00-008a/ Black Fib.; Solid	NAD	51% Cellulose 49% Non-Fibrous
19	34-07/21/00-008b/ Brown Fib.	NAD	95% Cellulose 5% Non-Fibrous
20	34-07/21/00-009a/ Black Fib.	NAD	52% Cellulose 48% Non-Fibrous
21	34-07/21/00-009b/ Brown Fib.	NAD	100% Cellulose
22	34-07/21/00-010a/ Black/Yellow Fib.; Solid	NAD	40% Cellulose 20% Fibrous Glass 40% Non-Fibrous
23	34-07/21/00-010b/ Yellow Fib.	NAD	90% Fibrous Glass 10% Non-Fibrous
24	34-07/21/00-010c/ Black Fib.	NAD	55% Cellulose 45% Non-Fibrous
25	34-07/21/00-011a/ Black Fib.	NAD	40% Cellulose 20% Fibrous Glass 40% Non-Fibrous
26	34-07/21/00-011b/ Yellow Fib.	NAD	5% Cellulose 90% Fibrous Glass 5% Non-Fibrous
27	34-07/21/00-011c/ Black Fib.	NAD	50% Cellulose 10% Fibrous Glass 40% Non-Fibrous
28	34-07/21/00-012a/ Black Fib.	NAD	50% Cellulose 10% Fibrous Glass 40% Non-Fibrous

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

CLIENT NUMBER: 86-4384 D
 EHS PROJECT #: 08-00-1688
 PROJECT: 6011-004

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
29	34-07/21/00-012b/ Yellow Fib.	NAD	2% Cellulose 90% Fibrous Glass 8% Non-Fibrous
30	34-07/21/00-012c/ Black Fib.	NAD	55% Cellulose 5% Fibrous Glass 40% Non-Fibrous

QC SAMPLE: M2-1999-3
 REPORTING LIMIT: 1% Asbestos
 METHOD: Polarized Light Microscopy, EPA Method 600/R-93/116
 ANALYST: Donna Britt Blackwell

Reviewed By Authorized Signatory: 
 Howard Varner, Laboratory Director
 Irma Foszewski, Quality Assurance Coordinator
 David Xu, MS, Senior Chemist
 Feng Jiang, MS, Senior Geologist

Results represent the analysis of samples submitted by the client. Sample location, description, area, volume, etc., was provided by the client. This report cannot be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written consent of Environmental Hazards Services, L.L.C. California Certification #2319

Environmental Hazards Services, L.L.C. recommends reanalysis by point count (for more accurate quantification) or Transmission Electron Microscopy (TEM), for enhanced detection capabilities) for materials regulated by the EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by polarized light microscopy (PLM). Both services are available for an additional fee.

LEGEND NAD = no asbestos detected
 SCF = suspected ceramic fibers

n1.dot/01 APR 1999/ mec

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

7488 WHITE PINE ROAD - RICHMOND, VA 23237
804-275-4788 FAX 804-275-4907

FILE COPY

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: Osborn/Warner/Madison Joint Venture
1300 E. Ninth Street, Suite 1510
Cleveland, OH 44114-1503

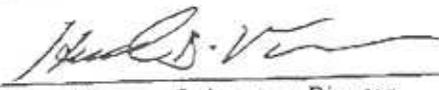
DATE OF RECEIPT: 14 AUG 2000
DATE OF ANALYSIS: 14 AUG 2000
DATE OF REPORT: 15 AUG 2000

CLIENT NUMBER: 36-4384 D
IHS PROJECT #: 08-00-1690
PROJECT: 6011-004

PM:	JOB #:		
LOG-IN:	Vendor Submitted	Project In	
DIST: Orig.	Proj. File	Individual	
	Site/Member	Proj. Dwr.	
% ASBESTOS To:		OTHER MATERIALS	
NAD (Trace Only)		30% Cellulose 70% Non-Fibrous	

IHS SAMPLE #	CLIENT SAMPLE # LABORATORY GROSS DESCRIPTION	% ASBESTOS To:	OTHER MATERIALS
01	35-1/07/20/00-001A/ Black Fib.	NAD	30% Cellulose 70% Non-Fibrous
02	35-1/07/20/00-001B/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous
03	35-1/07/20/00-001C/ Black Fib.	NAD	30% Cellulose 70% Non-Fibrous
04	35-1/07/20/00-002A/ Black Fib.	NAD	30% Cellulose 70% Non-Fibrous
05	35-1/07/20/00-002B/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous
06	35-1/07/20/00-002C/ Black Fib.	NAD	40% Cellulose 60% Non-Fibrous
07	35-1/07/20/00-003A/ Black Fib.	NAD	30% Cellulose 70% Non-Fibrous
08	35-1/07/20/00-003B/ Brown Fib.	NAD	90% Cellulose 10% Non-Fibrous
09	35-1/07/20/00-003C/ Black Fib.	NAD	30% Cellulose 70% Non-Fibrous

QC SAMPLE: M1-1998-4
REPORTING LIMIT: 1% Asbestos
METHOD: Polarized Light Microscopy, EPA Method 600/R-93/116
ANALYST: Robin Daniel

Reviewed By Authorized Signatory: 
Howard Varner, Laboratory Director
Irma Paszewski, Quality Assurance Coordinator
David Xu, MS, Senior Chemist
Feng Jiang, MS, Senior Geologist

FILE COPY

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

7465 WHITE PINE ROAD - RICHMOND, VA 23237
804-275-4788 FAX 804-275-4907

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: Osborn/Warner/Madison Joint Venture
1300 E. Ninth Street, Suite 1510
Cleveland, OH 44114-1503

DATE OF RECEIPT: 14 AUG 2000
DATE OF ANALYSIS: 14 AUG 2000
DATE OF REPORT: 14 AUG 2000
AMENDED: 16 AUG 2000

CLIENT NUMBER: 36-4384 D
EHS PROJECT #: 08-00-1703
PROJECT: 6011-004; Building #53

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
01	53-08/3/00-001A/ Black Fib.	NAD	15% Cellulose 85% Non-Fibrous
02	53-08/3/00-001B/ Brown Fib.	NAD	98% Cellulose 2% Non-Fibrous
03	53-08/3/00-002A/ Black Fib.	NAD	15% Cellulose 85% Non-Fibrous
04	53-08/3/00-002B/ Brown Fib.	NAD	98% Cellulose 2% Non-Fibrous
05	53-08/3/00-003A/ Black Fib.	NAD	15% Cellulose 85% Non-Fibrous
06	53-08/3/00-003B/ Brown Fib.	NAD	98% Cellulose 2% Non-Fibrous

QC SAMPLE: M2-1999-2
REPORTING LIMIT: 1% Asbestos
METHOD: Polarized Light Microscopy, EPA Method 600/R-93/116
ANALYST: Kathy Sizemore

PM:		JOB #:	
LOG-IN:	Vendor Submittal	Project In	
DIST: Orig.	Proj. File	Individual	
	Sticker/Handler	Proj. Dwr.	
Copies To:			
Reviewed By Authorized Signatory:		Signs Only:	

Howard Varner, Laboratory Director
Irma Foszewski, Quality Assurance Coordinator
David Xu, MS, Senior Chemist
Feng Jiang, MS, Senior Geologist

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.7489 WHITE PINE ROAD - RICHMOND, VA 23237
804-275-4788 FAX 804-275-4907**BULK ASBESTOS SAMPLE ANALYSIS SUMMARY**

CLIENT: Osborn/Warner/Madison Joint Venture
1300 E. Ninth Street, Suite 1510
Cleveland, OH 44114-1503

DATE OF RECEIPT: 14 AUG 2000
DATE OF ANALYSIS: 14 AUG 2000
DATE OF REPORT: 14 AUG 2000

CLIENT NUMBER: 36-4384 D
EHS PROJECT #: 08-00-1704
PROJECT: 6011-004; Building #54

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
01	54-07/24/00-001A/ Black Fib.	NAD	15% Cellulose 85% Non-Fibrous
02	54-07/24/00-001B/ Brown Fib.	NAD	98% Cellulose 2% Non-Fibrous
03	54-07/24/00-002A/ Black Fib.	NAD	15% Cellulose 85% Non-Fibrous
04	54-07/24/00-002B/ Brown Fib.	NAD	98% Cellulose 2% Non-Fibrous
05	54-07/24/00-003A/ Black Fib.	NAD	15% Cellulose 85% Non-Fibrous
06	54-07/24/00-003B/ Brown Fib.	NAD	98% Cellulose 2% Non-Fibrous

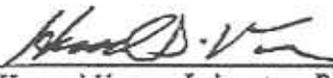
QC SAMPLE: M2-1999-2

REPORTING LIMIT: 1% Asbestos

METHOD: Polarized Light Microscopy, EPA Method 600/R-93/116

ANALYST: Kathy Sizemore

Reviewed By Authorized Signatory:


Howard Varner, Laboratory Director
Irma Faszewski, Quality Assurance Coordinator
David Xu, MS, Senior Chemist
Feng Jiang, MS, Senior Geologist

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

7489 WHITE PINE ROAD - RICHMOND, VA 23237

804-275-4788 FAX 804-275-4907

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: Osborn/Warner/Madison Joint Venture
1300 E. Ninth Street, Suite 1510
Cleveland, OH 44114-1503

DATE OF RECEIPT: 14 AUG 2000
DATE OF ANALYSIS: 14 AUG 2000
DATE OF REPORT: 14 AUG 2000

CLIENT NUMBER: 36-4384 D
EHS PROJECT #: 08-00-1699
PROJECT: 6011-004

EHS SAMPLE #	CLIENT SAMPLE #/ LABORATORY GROSS DESCRIPTION	% ASBESTOS	OTHER MATERIALS
01	95-08/4/00-001A/ Black Fib.	NAD	10% Cellulose 90% Non-Fibrous
02	95-08/4/00-002A/ Black Fib.	NAD	10% Cellulose 90% Non-Fibrous
03	95-08/4/00-003A/ Black Fib.	NAD	10% Cellulose 90% Non-Fibrous

QC SAMPLE: M2-1998-1

REPORTING LIMIT: 1% Asbestos

METHOD: Polarized Light Microscopy, EPA Method 600/R-93/116

ANALYST: Danielle Pearson

Reviewed By Authorized Signatory: 

Howard Varner, Laboratory Director
Irma Faszewski, Quality Assurance Coordinator
David Xu, MS, Senior Chemist
Feng Jiang, MS, Senior Geologist

Results represent the analysis of samples submitted by the client. Sample location, description, area, volume, etc., was provided by the client. This report cannot be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written consent of Environmental Hazards Services, L.L.C. California Certification #2319

Environmental Hazards Services, L.L.C. recommends reanalysis by point count (for more accurate quantification) or Transmission Electron Microscopy ((TEM), for enhanced detection capabilities) for materials regulated by the EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by polarized light microscopy (PLM). Both services are available for an additional fee.

LEGEND NAD = no asbestos detected
SCF = suspected ceramic fibers

plm1.dot/01 APR 1999/ dpb

-- PAGE 01 of 01 -- END OF REPORT --

Project Title: REPAIR ROOFS -- VARIOUS BUILDINGS	Location:	Contractor:	Lead Designer:
--	-----------	-------------	----------------

TRANS CONTROL NO	SPEC SECTN NO.	SD NO, AND TYPE OF SUBMITTAL MATERIAL OR PRODUCT	SPEC PARA NO.	GOVT OR A/E REVIEWER	DATE DUE FROM CONTRCTR	DATE RCV FROM CONTRCTR	APPROVING AUTHORITY ACTION			DATE DUE BACK TO CONTRCTR	DATE MLD TO CONTRCTR	REMARKS
							DATE FRM LEAD TO REVIEWER	DATE FRM. REVIEWER TO LEAD	ACT CODE			
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
	01110	SD-18 Records	1.3									
		Utility Outages										
	01315	SD-01 Data	1.3									
		Project Submittal Schedule										
	01411	SD-08 Statements	1.3									
		Safety Plan										
		Protection Plan										
	01411	SD-13 Certificates	1.3									
		License Certificates										
		Radiation Materials and Equipment										
	01780	SD-08 Statements	1.3									
		Work Plan										
		Contractor's warranty										
	02220	SD-08 Statements	1.2									
		Demolition Plan										
	02220	SD-18 Records	1.2									
		Existing Conditions										
	04200	SD-09 Reports	1.2									
		Test Reports										
	04200	SD-14 Samples	1.2									
		Mortar										
	07220	SD-01 Data	1.2									
		Manufacturer's Catalog Data										
		Thermal Insulation Materials										
		Deck Primer										
		Sheathing Paper										
		Fastening Materials										
		Insulation Adhesives										
	07220	SD-06 Instructions	1.2									
		Manufacturer's Instructions										
		Roof Insulation										
	07220	SD-14 Samples	1.2									

* NASA Notes:
 Approved by:
 Blank: Contracting Officer

ACTION CODES: NR: Not Reviewed AN: Approved as Noted
 A: Approved RFC: Returned for Correction
 (Others may be prescribed by the Transmittal Form)

Project Title: REPAIR ROOFS -- VARIOUS BUILDINGS	Location:	Contractor:	Lead Designer:
--	-----------	-------------	----------------

TRANS CONTROL NO	SPEC SECTN NO.	SD NO, AND TYPE OF SUBMITTAL MATERIAL OR PRODUCT	SPEC PARA NO.	GOVT OR A/E REVIEWER	DATE DUE FROM CONTRCTR	DATE RCV FROM CONTRCTR	APPROVING AUTHORITY ACTION			DATE DUE BACK TO CONTRCTR	DATE MLD TO CONTRCTR	REMARKS
							DATE FRM LEAD TO REVIEWER	DATE FRM. REVIEWER TO LEAD	ACT CODE			
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
	07220	high-density fiber roof insulation rigid foam roof insulation										
	07511	SD-01 Data Manufacturer's Catalog Data Base Sheet Roofing Felts Bituminous Plastic Cement Cants Aggregate Surfacing Roof Walkways Adhesives Elastomeric Flashing Sheet	1.2									
	07511	SD-13 Certificates certificate Manufacturer's Roofing System Warranty	1.2									
	07512	SD-01 Data Manufacturer's Catalog Data Roofing Felts Bituminous Plastic Cement Cants Aggregate Surfacing Roof Walkways Adhesives Flashing Sheet	1.2									
	07512	SD-13 Certificates certificate Manufacturer's Roofing System Warranty	1.2									
	07600	SD-04 Drawings Fabrication Drawings Flashing	1.2									

* NASA Notes:
Approved by:
Blank: Contracting Officer

ACTION CODES: NR: Not Reviewed AN: Approved as Noted
A: Approved RFC: Returned for Correction
(Others may be prescribed by the Transmittal Form)

Project Title: REPAIR ROOFS -- VARIOUS BUILDINGS	Location:	Contractor:	Lead Designer:
--	-----------	-------------	----------------

TRANS CONTROL NO	SPEC SECTN NO.	SD NO, AND TYPE OF SUBMITTAL MATERIAL OR PRODUCT	SPEC PARA NO.	GOVT OR A/E REVIEWER	DATE DUE FROM CONTRCTR	DATE RCV FROM CONTRCTR	APPROVING AUTHORITY ACTION			DATE DUE BACK TO CONTRCTR	DATE MLD TO CONTRCTR	REMARKS
							DATE FRM LEAD TO REVIEWER	DATE FRM. REVIEWER TO LEAD	ACT CODE			
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
	07600	Sheet Metal Accessories										
	07920	SD-01 Data Manufacturer's Catalog Data Elastomeric Sealants	1.2									
	07920	SD-14 Samples Sealing Compound Labels Backup Material	1.2									
	09915	SD-04 Drawings Manufacturer's Standard Color Charts	1.2									
	09915	SD-07 Schedules Certificates	1.2									
	13281	SD-02 Manufacturer's Catalog Data Local exhaust equipment Vacuums Respirators Pressure differential automatic recording instrument Amended water Material Safety Data Sheets (MSDS) for all materials Encapsulants	3.1.4									
	13281	SD-08 Statements Asbestos hazard abatement plan Testing laboratory Private qualified person documentation Landfill approval Employee training Medical certification	1.4.2.1									

* NASA Notes:
Approved by:
Blank: Contracting Officer

ACTION CODES: NR: Not Reviewed AN: Approved as Noted
A: Approved RFC: Returned for Correction
(Others may be prescribed by the Transmittal Form)

Project Title: REPAIR ROOFS -- VARIOUS BUILDINGS	Location:	Contractor:	Lead Designer:
--	-----------	-------------	----------------

TRANS CONTROL NO	SPEC SECTN NO.	SD NO, AND TYPE OF SUBMITTAL MATERIAL OR PRODUCT	SPEC PARA NO.	GOVT OR A/E REVIEWER	DATE DUE FROM CONTRCTR	DATE RCV FROM CONTRCTR	APPROVING AUTHORITY ACTION			DATE DUE BACK TO CONTRCTR	DATE MLD TO CONTRCTR	REMARKS
							DATE FRM LEAD TO REVIEWER	DATE FRM. REVIEWER TO LEAD	ACT CODE			
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
	13281	Waste shipment records										
		Respiratory Protection Program										
		Hazardous waste manifest										
	13281	SD-12 Field Test Reports	1.4.3.1									
		Air sampling results										
		Pressure differential recordings for local exhaust system										
		Asbestos disposal quantity report										
		Encapsulation test patches										
		Clearance sampling										
	13281	SD-13 Certificates	3.1.5									
		Vacuums										
		Water filtration equipment										
		Ventilation systems										
		equipment used to contain airborne asbestos fibers										
		encapsulants										
	13281	SD-18 Records	1.4.5.1									
		Notifications										
		Rental equipment										
		Respirator program records										
		Permits and licenses										
	13282	SD-02 Manufacturer's Catalog Data	1.7.4									
		Vacuum filters										
		Respirators										
	13282	SD-06 Instructions	2.1									
		Chemicals										
		Materials										
		Material safety data sheets										
	13282	SD-08 Statements	1.5.3.1									
		Qualifications of CP										
		Testing laboratory and consultant										

* NASA Notes:
 Approved by:
 Blank: Contracting Officer

ACTION CODES: NR: Not Reviewed AN: Approved as Noted
 A: Approved RFC: Returned for Correction
 (Others may be prescribed by the Transmittal Form)

